January-February 1993

FAA Aviation News

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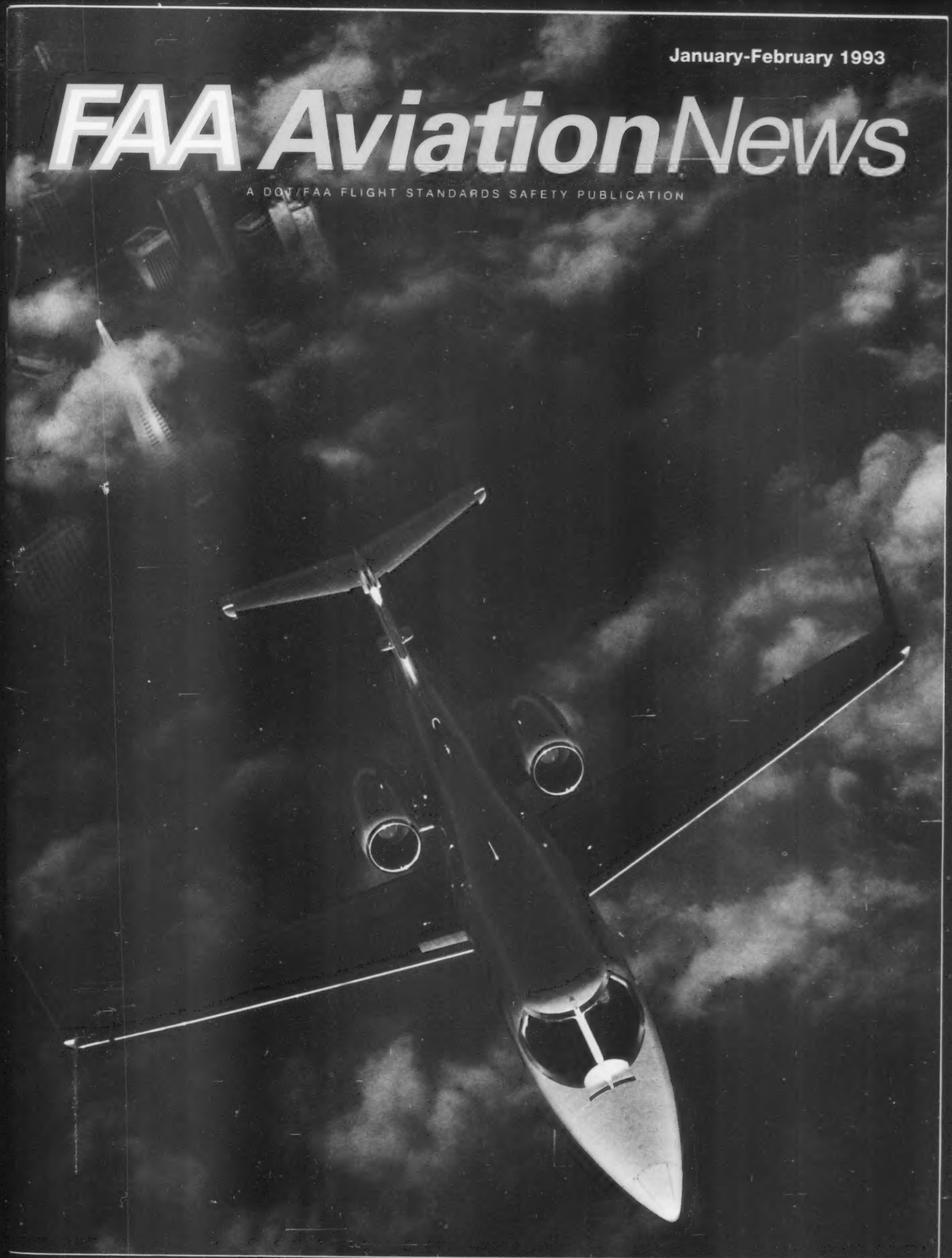

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FAA Aviation News

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On the Covers:
It does not matter if you are rated in a Learjet 31A, such as the one on the cover flying over San Francisco Bay, or in a Piper Warrior, as on the back cover, when an emergency happens—are you ready for it? Photos courtesy of Learjet and Piper Aircraft.

Aviation Safety Through Flight Proficiency

by Lauren D. Basham, *FAA Aviation Safety Inspector*

Someone once said, "Look to the future; that's where you'll spend the rest of your life." How significant this statement is. How important it really is for each of us to consider what lies ahead, what new experience is "just around the corner" to cope with.

In this dynamic industry in which we find ourselves, we can readily predict much of the experience that is in store for us "just around the corner." We can also prepare in advance to meet this eventuality with insight, confidence, and, most of all, with the knowledge that we can handle whatever it is. So, maybe some day we do have an engine malfunction. Through training, practice, and experience the *successful outcome* of this minor problem is predictable. Radio problems? No sweat—through training and knowledge of procedures the *successful outcome* of this minor problem is also predictable. Gear malfunction? Through training and knowledge of emergency extension procedures, the *successful outcome* of this minor event is predictable. Unforecast inclement weather? Through training, knowledge, and proper preflight planning the *successful outcome* of this minor irritation is easily predictable.

Come what may—rain, snow, sleet, wind, engine, radio, gear, etc, etc.—our best insurance for a *successful outcome* is thorough initial training and then recurrent training to obtain new knowledge; review and practice; and a complete understanding of ourselves and the complexity of the systems we use. Complacency, overconfidence, lack of knowledge, or an "I don't give a d**n" attitude predict damage, injury, and, worst of all, widows, widowers, and orphans. Don't misunderstand; we in the FAA have nothing against widows, widowers, or orphans. We do not appreciate the manner in which we in aviation produce them.

Lauren D. Basham

Now, what this all adds up to is this: If you take this advice, I will predict something for you. If you will take just a couple of hours of your time to visit and fly with your favorite flight instructor and take his or her advice regarding your need for additional training and practice, learn your aircraft's limitations as well as your own, and then promise yourself and your loved ones you will operate within these limitations, *I predict* that you can become what all pilots long to become—an Old Pilot. The future, starting today, is the time for you to become a "Pro." Pro is short for proficiency. No matter what type of certificate you now hold, you can only benefit from recurrent training, and you will make your insurance company happy, too. Drop us a card letting us know that you are working to become a Pro. We would appreciate it. ■

If any of you reading this are from Montana and this sounds familiar, you received this message from your Accident Prevention Specialist in the Helena, Montana General Aviation District Office some 22 years ago. This, of course, was written in the days before biennial flight reviews and the "Wings" program, before GADO's became FSDO's, and before Accident Prevention Specialists became APPM's, but its message has not faded over the two decades since Mr. Basham thought enough of his "Montana Pilots" to mail it to them. Now, as a specialist in the Airman Certification Branch of the General Aviation and Commercial Division in FAA headquarters, Mr. Basham can spread the word to a larger audience—be a Pro! ***—The Editor***

Special Series: **FAA and Education**

Shaping Aviation's Future

by Dean Chamberlain, *Associate Editor*

Education. The word means different things to different people, but to a select group of students education is their key to enter the exciting world of aviation. Their education may open the door to a cockpit career, provide them the opportunity to help design the next generation aircraft, give them the chance to solve the latest aircraft maintenance problem, or give them the opportunity to resolve the latest management crisis. For all, it means making hard career decisions, selecting the right school, finding tuition money, graduating, and finding a job. For the successful, their aviation education offers them the opportunity to follow their dreams in which the sky is not a limitation but an opportunity. For them, the sky is their future.

If you are wondering why we are writing about education instead of safety, the answer is simple. Education contributes to safety. We are also branching off our FAA/industry partnership series by highlighting the Federal Aviation Administration's ongoing partnership with the aviation education community and the vital role education plays in aviation safety. In our last series, we discussed how representative aviation membership groups and the FAA work together to promote aviation safety. Now we are emphasizing the role education plays in aviation and aviation safety. This first article in the series is introductory in nature and discusses how tomorrow's aviation professionals are being trained and the role the FAA plays in that training. The series will eventually highlight several representative types of educational programs at schools around the country to show there is a curriculum available to meet every student's needs. So, in recognition of the unique challenges schools face in training tomorrow's aviation professionals, we would like to dedicate this series to all of the schools training today's students to meet tomorrow's aviation/aerospace needs.

FAA and Education

Few people realize how much money the FAA contributes to aviation education. We are not talking about federal student loans. We are talking about millions of dollars given as grants to schools for buildings and equipment that support aviation-related educational programs. This money is disbursed through the Airway Science Grant Program to support the Airway Science Program (AWS). According to Ms. Margaret Powell, Manager, AWS Curriculum Program, AWS is a series of FAA-approved, four-year degree programs at various colleges and universities nationwide. The programs are designed to meet the aviation training and employment needs of both FAA and the aviation industry.

Ms. Virginia Hancock Krohn, Manager, Airway Science Grant Program, said the FAA AWS Grant Program's objective is to help defray the high cost of Airway Science Program needs through federal grants. The monetary goal of the AWS Grant Program is to enhance student educational opportunities through use of state-of-the-art instructional facilities and equipment.

Although we are highlighting the FAA's role in the AWS Program, we cannot ignore the support provided by private industry. Well-known aerospace and high-tech companies have for years recognized the long-term benefits of supporting aviation-related programs at colleges and universities around the country. Their support includes cooperative educational programs, internships, and the hiring of AWS graduates and others with a strong background in aviation-related subjects.

Helping colleges train students for careers in aviation is one way FAA fulfills its Congressional mandate to "encourage and foster" civil aviation. The FAA's Airway Science Curriculum Program was developed in partnership with the University Aviation Association and the

Airway Science Curriculum Committee in the early 1980's to fill the need for college-trained aviation professionals. AWS's FAA-approved aviation curriculum was designed to train aviation students to meet the FAA's and the aviation industry's needs. Based upon a common core of subjects similar to those required for every college degree, the 2,157 students enrolled in AWS programs today are specializing in one of the following five areas: Airway Science Management, Airway Computer Science, Aircraft Systems Management, Airway Electronic Systems, or Aviation Maintenance Management. Each program consists of at least 40 semester hours of specialized training in a group of courses known as a program's Area of Concentration (AOC) and a minimum number of supporting courses called Core Subject Area (CSA) courses. For example, the Airway Computer Science AOC's minimum requirement is met by studying 40 hours of computer science courses. The Aircraft Systems Management AOC involves flight training as well as aviation related flight subjects as part of its program.

In addition to meeting the AOC minimum requirement, each program also requires a student to complete the common Core Subject Area requirement, which is at least a minimum of 80 semester hours needed to meet the FAA-general curriculum requirement. The following is a breakdown of each student's common Core Subject Area requirement: At least 24 to 30 semester hours of General Studies, 21 to 28 hours of Math and Science/Technology, nine hours of Computer Science, nine to 12 hours of Management, 15 hours of Aviation, and 30 hours of General Electives or a total sufficient to meet the school's graduation requirements and meet the 80-hour minimum Core Subject Area requirement. As you can see, each program option emphasizes math, science, computer, and management courses. Courses designed to help students succeed in today's technological aviation arena.

In addition to the four-year AWS college programs, the FAA in conjunction with the University Aviation Association is now developing a new two-year AWS Program to satisfy the needs of those programs that may not require a four-year college degree. Details on the new two-year program should be available soon from the FAA AWS Program resource managers listed at the end of this article.

AWS Support

Since we have briefly reviewed the AWS Program, and the FAA's role in helping develop it, it is time to discuss some of the ways the FAA supports the program. Although the FAA hires a limited number of AWS graduates each year and participates in cooperative education programs for AWS students, FAA's greatest contribution to the program is through monetary grants to AWS schools. Over the years, Congress, through the FAA, has appropriated millions of dollars to fund grants for AWS schools. From Fiscal Years (FY) 1982 through 1991, FAA awarded more than $61 million to 35 AWS schools. About 24 percent of those grants went to minority schools. During FY 1992, $20 million was available for AWS support. Of that amount, $16.2 million was awarded through seven Congressionally designated awards to specific schools. FAA is in the process of competitively awarding the remaining $3.8 million. Thirty million dollars in Congressionally designated awards will be distributed by the FAA to designated schools during FY 1993.

We have included a list of AWS schools (see p.5) to help students interested in pursuing an aviation education identify AWS schools. Students seeking information about a particular school should contact the school directly. School officials interested in learning more about the AWS Program should contact the FAA's Office of Training and Higher Education in Washington, DC. The address for AWS information is Higher Education and Advanced Technology Staff, 400 7th Street S.W., AHT-30, Washington, DC 20590.

Aviation Research

In addition to helping support the AWS Program, FAA also funds aviation-related research at many colleges and universities. The research plays an important role in both adding to the industry's scientific data base and in promoting safety. According to Mr. James Remer, Grants Officer, FAA Office of Research and Technology, the FAA is developing and expanding its new Aviation Research Grant Program. The program, established by two recent Public Laws, PL-101-508 and PL-101-604, has awarded 30 grants for more than $20 million for research at various schools. One example of the FAA's commitment to certain long-term research projects is its establishment of a new joint research project at the Georgia Institute of Technology and Rutgers, the State University of New Jersey. The $1.5 million project established the first FAA Center of Excellence in Computational Modeling of Aircraft Structures at the schools. The schools will use crash scenario modeling and aircraft structural modeling for FAA aircraft certification related research and to study the long-term effects of metal fatigue and corrosion on aging aircraft. Both areas of study are of importance to the FAA as it explores the use of new technology in aircraft design as well as preserving the aircraft already flying. The new Center of Excellence concept provides the FAA the means to support long-term research in specific subject areas at select schools that have the expertise to be designated as Centers of Excellence. Together with traditional research funding the new Centers of Excellence program will provide the FAA-sponsored research information the aviation industry and the FAA need to ensure America remains competitive in today's and tomorrow's global aviation environment. An indirect benefit of these FAA supported research projects is the challenging educational opportunities the projects provide students participating in the studies. The value of these various programs is reflected in the number of past projects that have become important household names in the aviation industry. Cockpit/crew resource management, controller-pilot interaction, aging aircraft studies, composite construction materials and techniques, and wind shear studies are but a few of the names of research projects airmen have benefitted from. Institutions and companies interested in submitting research grant proposals to the FAA can contact Mr. Remer at the Office of Research and Technology Applications, ACL-1, FAA Technical Center, Atlantic City International Airport, NJ 08405. A voice mail telephone number is also available for requesting research grant information, solicitation, or application

K THROUGH 12 PROGRAMS

Although we are focusing on post-high school educational programs supported in part by the FAA in this series, FAA also supports elementary and high school programs for grades K through 12 by providing a wide range of educational material, both for teachers and students, for classroom use. The material, which includes such items as curriculum guides and a wide range of other types of aviation-related educational materials, is designed to help teachers explain to students the important role aviation plays in their daily lives. The material is so designed that no specialized aviation knowledge is required of the teacher wanting to use the material. To help distribute its educational materials the FAA has established Aviation Education Resource Centers at selective sites around the country. The Centers serve as central distribution points for printed material, videotapes, slides, computer materials, and other types of aviation material. The dedicated Center coordinators and their staff members also serve as valuable information resources for both the program and aviation subjects. Educators and media representatives are encouraged to contact the Centers for help or materials as needed. A list of Aviation Education Resource Centers (see p.5) is provided for your convenience.

In addition to the Aviation Education Resource Centers and the nine FAA Regional Headquarters that provide educational support within their respective areas, the FAA's Office of Public Affairs Aviation Education Program and the FAA's Office of Training and Higher Education, both in Washington, DC, provide information on many of the FAA's educational and funding programs. Their addresses are also listed on page 5.

FAA REGIONAL AWS COORDINATORS

NAME	REGION	TELEPHONE
Sharron Feland	FAA Aeronautical Center *Oklahoma City, OK*	405 680–5295
Dave Bruebaker	Alaskan	907 271–5375
Lovia Riding	Central	816 426–2928
Bruce Wynn	Eastern	718 553–1968
Myrna Rivera	Great Lakes	312 694–7893
Katrina Newlin	New England	617 273–7322
Maureen Coulter	Northwest Mountain	206 227–2012
George Burnette	Southern	404 763–7916
Donna Thayer	Southwest	817 624–5839
William Green	FAA Technical Center *Atlantic City, NJ*	609 484–6615
Barbara Keller	Western Pacific	213 297–0501

packages. The number is (609) 484-4761.

AWS and Safety

Although the AWS Program is important to the FAA, as a safety magazine, *FAA Aviation News* is more interested in how the AWS Program contributes to aviation safety. As we said, one of the obvious ways the program supports safety is through the academic contributions the various schools make to the industry's overall scientific data base. Research projects are a good example of some of these safety applications. There is another equally important way that may not be as apparent as scientific data and research projects, and that is the way the schools instill an attitude of professional responsibility in the hearts and minds of their AWS students. Only when knowledge, technical skill, and professional responsibility are combined do we really have a true aviation professional.

We think everyone will agree that education has always played an important role in aviation and aviation safety. Every airman is familiar with the FAA's long standing interest in airmen training and certification. So why our current interest in education? Simply stated, times have changed. In the past, maintenance technicians, pilots, and others, could have very successful careers in aviation with just their respective FAA certificates. In today's highly competitive business and work environment, many jobs now require advanced training and knowledge that goes beyond the basic FAA airmen certification requirements. This requirement for more education and training was one of the reasons the FAA worked with the education community and the aviation industry to help develop college-level degree programs to satisfy this need. A quick review of some of the schools participating in the AWS Program shows there is a type of school to meet every student's needs and budget. The key is identifying and matching each student's personal and professional goals with the type of school that can best fulfill them.

Preparing for the Future

But before we start our series on the various types of schools with AWS Programs, no discussion about education and aviation would be complete without a reminder for the next generation of airmen and teachers. We want to remind our younger readers that while there are many fine schools available that can provide each of you a quality education when you are old enough to attend, the time to start preparing to follow your aviation dream is now, before you graduate from high school and start pursuing your career goals. Like every profession, the secret for a successful career in aviation includes making good grades while you are in school and getting a quality education which includes taking all of the higher-level science and math courses you can. If you are planning on going to college that also means enrolling in a college preparatory program, working hard, developing perseverance, and having a certain amount of luck. Although FAA may not be able to improve your luck, the FAA may be able to help you obtain the education you need to make your own luck. And when you make the grade, the aviation industry will be waiting for you.

In our March 1993 issue we will highlight the first of many fine higher aviation education institutions. The featured school will be Embry-Riddle Aeronautical University with campuses in Daytona Beach, Florida and Prescott, Arizona. ■

AWS INSTITUTIONS

Federal Aviation Administration Airway Science Recognized Institutions with their Airway Science Areas of Concentration. Areas of Concentration are as follows: MGT=Airway Science Management; CSC=Airway Computer Science; SYS=Aircraft Systems Management; ELE=Airway Electronic Systems; and MNT=Aviation Maintenance Management.

Arizona State University, MGT:SYS
Tempe, AZ 85287
Dr. Laurence E. Gesell
Dept. of Aeronautical Technology
602/965–7775

Auburn University, MGT:SYS
162 Wilmore Lab
Auburn University, AL 36849
Mr. Emmett F. Johnson
Aerospace Engineering
205/844–6848

Averett College, MGT
420 West Main Street
Danville, VA 24541
Mr. David Ruev
Asst. Prof of Aviation
804/791–5615

Baylor University, SYS
P.O. Box 97440
Waco, TX 76798–7440
Dr. Max Shauck
Project Chairman
817/848–5050

Bridgewater State College, MGT:SYS
Bridgewater, MA 02325
Mr. William L. Anneseley
Aviation Science Coordinator
617/697–1395

Central Missouri State University, ELE
Technology Complex 210
Warrensburg, MO 64093
Dr. Tim Brady
Chair., Dept. of Power & Transportation
816/543–4975

Central Washington University,
MGT:SYS:ELE:MNT
Hebeler 101, Ellensburg, WA 98926
Dr. Robert M. Envick
Industrial & Engineering Technology
509/963–3691

Chadron State College, MGT:CSC:ELE
Chadron, NE 69337
Dr. M. L. Gramberg
Div. of Vocational & Tech. Education
308/432–6365

Daniel Webster College, MGT:CSC
20 University Drive
Nashua, NH 03063
Mr. Thomas Teller
Airway Science Coordinator
603/883–3556

Delaware State College, MGT:SYS
1200 North DuPont Highway
Dover, DE 19901
Dr. Pamela McDermott
Chair., Airway Science Department
302/739–3535

Delta State University, MGT:SYS
Box 3203
Cleveland, MS 39833
Mr. Robert H. Ryder
Commercial Aviation
601/846–4206

Dowling College, MGT:CSC:SYS
Idle Hour Boulevard
Oakdale, NY 11769
Dr. Paul Whelan
Dean, School of Aviation and Trans.
516/244–3077

Edward Waters College, MGT
1658 Kings Rd., Jacksonville, FL 32209
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904/366–2739

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ECSU Box 823 Elizabeth City, NC 27909
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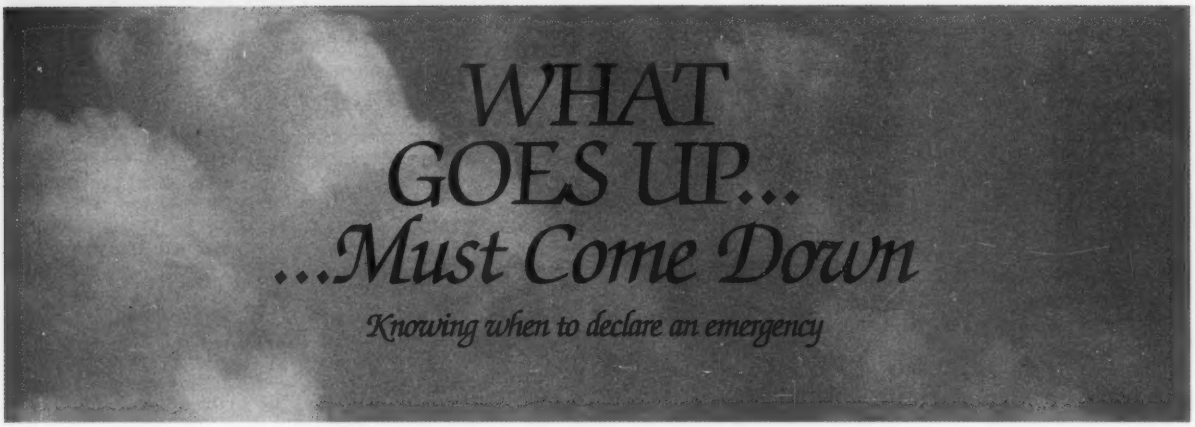


WHAT GOES UP... ...Must Come Down

Knowing when to declare an emergency

by Bill Richards, *ASRS Analyst*

This is the third in a series of articles reprinted from ASRS Directline, *a quarterly publication that addresses particular areas of safety that appear in pilot reports received by NASA's Aviation Safety Reporting System and which have been identified by safety analysts as "significant."* ASRS Directline *is free from ASRS, NASA-Ames Research Center, Moffett Field, CA 94035. Declaring an emergency is not something to be taken lightly, nor should it be considered a sign of weakness to do so when the appropriate time arises. Just remember, the air traffic system cannot respond accordingly to your emergency unless they know it is an emergency.* ***— Editor***

A three-engine wide-body air carrier aircraft climbing to flight level 410 experienced a compressor stall and had to shut down an engine just before leveling off. The flight crew ". . . advised center [that they were] descending, [had] shut down an engine, and need[ed] 24,000 feet."

The controller cleared the stricken aircraft for a descent to flight level 370, but the flight advised ". . . advised twice we had to get down [to yet a lower altitude]." Because of traffic at flight level 350, the controller was unable to approve their request, and so stated. The flight crew kept repeating their request for a lower altitude, and the controller kept repeating that he was "unable."

Controller's Dilemma

It is well-publicized that air carrier aircraft will flying very well with one and, in some cases, two engines shut down. What is not made clear is that this is not true at higher altitudes such as 37,000 feet; thus, it is possible that the controller in this incident did not realize the urgency of the need for a lower altitude. It is, however, more likely that the controller fully understood the seriousness of the flight crew's situation, but the controller's hands were tied.

An air traffic controller's primary function is to maintain certain minimum separation standards between aircraft. The controller was undoubtedly trying to provide the requested descent clearance as quickly as possible, but until he could clear traffic from below the troubled aircraft, the flight could not be issued a clearance to descend. An air traffic controller cannot issue a clearance that will result in a loss of standard separation but can and will provide assistance in the form of traffic call-outs and/or recommendations intended to increase separation between conflicting traffic.

Meanwhile the flight crew had lost control of their airplane. Minus the power of the failed engine, they were descending, and there was nothing they could do to prevent it. This was certainly an emergency situation, yet the crew never declared an emergency. The controller was finally able to vector the traffic out of the way and to clear the stricken aircraft for a continued descent, but by this time the aircraft had already descended slightly below flight level 370.

Emergency

I will not speculate why the flight crew did not declare an emergency; however, they may have neglected to assess properly the effect of their descent on other traffic in the vicinity and thus ATC's potential difficulty in maintaining traffic separation. Given the declaration of an emergency, the controller could have pointed out conflicting traffic to all involved and provided traffic advisories even though a loss of standard separation might result from the flight crew's actions.

A Different Twist

In another incident, a trans-Atlantic wide-body aircraft was forced to descend and reverse course after shutting down an engine. The flight crew advised the Center controller of the nature of their problem, requested a lower altitude, and stated they wanted to return to their departure airport. They made their situation, intentions, and altitude capability very clear. They also *declared an emergency*, but for some reason, Center did not acknowledge their declaration of an emergency. The crew began the "contingency procedure," announcing their intentions in the blind to all other traffic. Center was ". . . a bit slow at re-clearing us back towards [the departure airport] thereafter."

Upon changing to the next Center sector an hour later, the flight crew discovered that Center was treating the whole thing as a routine change of destination and that "no

emergency existed in the ATC view." In this case, no apparent conflicts arose. It can only be assumed that had Center understood that an emergency had been declared, their service would have been much more prompt. As with all ATC/aircraft communications, if a flight crew is not sure that a transmission or request has been properly understood, they should repeat their message and make sure that they receive a proper acknowledgement. In this instance, the fact that the flight was over water and using high frequency (HF) radio surely added to the breakdown in communications. Nonetheless, the flight crew must share the responsibility for accuracy in the information exchange.

The Pilot's Toolbox

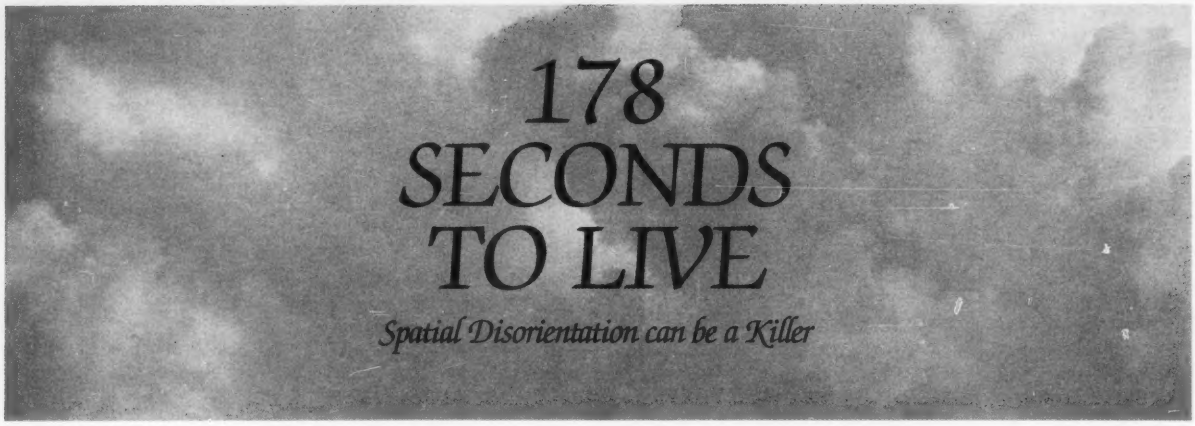
There seems to be great reluctance among pilots to declare an emergency. It is not uncommon for reporters to the ASRS to indicate that they believe that declaration of an emergency will bring the wrath of the FAA down upon them and cause them innumerable hours of tedious paperwork. FAR § 91.3(c) states that "Each pilot-in-command who deviates from a rule under paragraph (b) of this section shall, *upon the request* [emphasis added] of the Administrator, send a written report of that deviation to the Administrator." In most cases, the report of irregularity that the captain has already written for the company should provide all the information the FAA might need if they request it, and no further paperwork would be required. For a non-airline pilot, a telephone call to the chief of the ATC facility handling the emergency to explain the need for the special handling may suffice for a written report.

When determining if an emergency condition exists, flight crews need to consider the implication of their potential inability to conform to ATC instructions. Pilots should not frivolously declare emergencies, of course, but declaring an emergency is something in the pilot's "toolbox" that can be put to use if it is needed.

DON'T OVERLOOK IT. ■

The Aviation Safety Reporting System is a cooperative program established by the FAA's Office of the Assistant Administrator for Aviation Safety and administered by the National Aeronautics and Space Administration.

G. S. Livack



178 SECONDS TO LIVE

Spatial Disorientation can be a Killer

by Verdon Kleimenhagen, Ron Keones, and James Szajkovics *of FAA* and Ken Patz of *MN/DOT Office of Aeronautics*

If you are ever tempted to take off in marginal weather and you do not have an instrument rating or are not instrument current, read this article before you make your GO/NO-GO decision. If you decide to go anyway and subsequently lose visual contact with the ground, start counting down from 178 seconds. ***—Editor***

How long can a pilot, with or without a *current* instrument rating, expect to live after experiencing SPATIAL DISORIENTATION? Researchers at the University of Illinois found the answer to this question. Twenty student "Guinea pigs" in ground trainers flew into simulated instrument weather, and all went into graveyard spirals or rollercoaster-like oscillations. The outcomes differed in only one respect: The time required until control was lost. The interval ranged from 20 seconds to 480 seconds. The average time was 178 seconds—*just two seconds short of three minutes!!!* Here is the fatal scenario. . .

The sky is overcast and the visibility poor. That reported five-mile visibility looks more like two, and you cannot judge the height of the overcast. Your altimeter says you are at 1,500 feet, but your chart tells you there is terrain as high as 1,200 feet in this sector. There might be a tower nearby because you are not sure how far off course you are. But you have flown in weather worse than this, so you press on. You find yourself unconsciously easing back just a bit on the controls to clear those none-too-imaginary towers. With no warning, you are in the soup. You peer so hard into the milky white mist that your eyes hurt. You fight the feeling in your stomach. You swallow only to find your mouth dry. Now you realize you should have waited for better weather. The appointment was important but not that important. Somewhere a voice is saying, "You've had it. It's all over."

You Now Have 178 Seconds To Live!

Your aircraft feels on an even keel, but your compass turns slowly. You push a little rudder and add a little pressure on the controls to stop the turn, but this feels unnatural and you return the controls to their original position. This feels better, but your compass is now turning a little faster and your airspeed is increasing slightly.

You scan your instrument panel for help, but what you see looks unfamiliar. You are sure this is just a bad spot. You will break out in a few minutes (but you do not have a few minutes left. . .).

You Now Have 100 Seconds To Live!

You glance at your altimeter and are shocked to see it unwinding. You are already down to 1,200 feet. Instinctively you pull back on the controls, but the altimeter still unwinds. The engine RPM is into the red and the airspeed nearly so.

You Now Have 45 Seconds To Live!

Now you are sweating and shaking. There must be something wrong with the controls; pulling back only moves the airspeed further into the red. You can hear the wind tearing at the aircraft.

You Now Have 10 Seconds To Live!

Suddenly you see the ground. The trees rush up at you. You can see the horizon if you turn your head far enough, but it is at an unusual angle—you are almost inverted. You open your mouth to scream but. . .

You Now Have No Seconds Left!!

You have just become a victim of Spatial Disorientation.

UNDERSTANDING SPATIAL DISORIENTATION

Pilots have taken the subject of Spatial Disorientation far too lightly. If you look at the material presented on the test preparation for the Private Certificate and Instrument Ratings and the questions on the FAA examinations, this subject is the easiest to respond accurately to and yet the least understood.

Recent statistics from the National Transportation Safety Board indicate that Spatial Disorientation is the **number one cause of fatal accidents.** Most pilots think "Pilot Error" and "Weather" were the most common causes. Therefore efforts have been concentrated on adding better weather information systems. Example: FSS' computer briefing formats, DUAT, Kavouras, Pan Am, and a host of others that are now available. We promote courses in cock-

pit resource management and decisionmaking—all of these new information systems and training methodologies are great and have reduced the accident rates over the last 10 to 20 years. We do not emphasize the limitations of the human anatomy.

Pilots need to experience spatial disorientation in a controlled setting. Why? Because we have to dispel some common misconceptions and illustrate why flying aircraft is different than other two dimensional modes of transportation.

1. **Myth:** "Just Believe Your Instruments."

   Truth: Many pilots have no idea that some types of spatial disorientation are so incapacitating. Though the pilot knows something is wrong, the sensory conflict is so great that the thinking process breaks down and the pilot is unable to recover the aircraft. This may be compounded by the inability to obtain visual information due to blurring of vision (nystagmus).

2. **Myth:** "I'm an instrument-rated pilot, all of this spatial disorientation information doesn't really apply to me because I've already demonstrated my ability to fly in instruments."

   Truth: FAA Accident Reports tend to contradict this statement. Many instrument pilots experience spatial disorientation every year with fatal consequences.

3. **Myth:** "Continued flight into adverse weather, or flying VFR into IMC conditions are the real causes of many of the aviation accidents."

   Truth: What really caused the accident was spatial disorientation. Maybe this sounds a little like who came first, the "chicken or the egg." The pilot wouldn't have experienced spatial disorientation if it wasn't for the weather. However, again statistics still seem to indicate that just because we improve our weather information systems we still don't prevent this kind of accident. What pilots often don't understand is that weather, especially poor visibility, leads to spatial disorientation. Because pilots have never experienced spatial disorientation in a controlled situation, they do not know how incapacitating it can be, or how to avoid it.

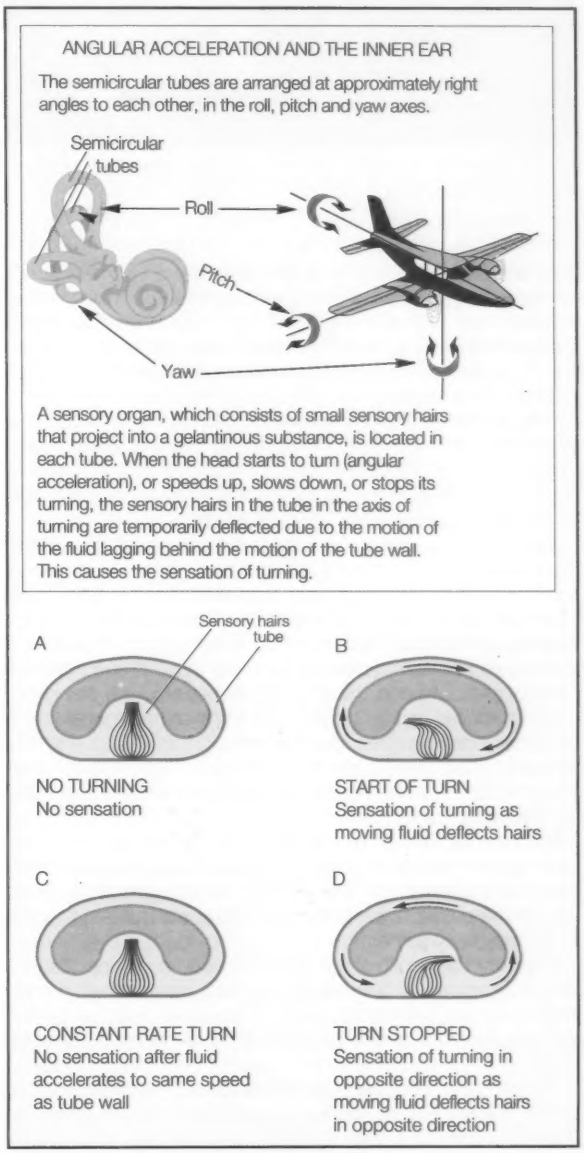
Case in Point: A private non-instrument-rated pilot, flying an aircraft that was not IFR equipped, departed an airport on his way home from Oshkosh, WI. After having been briefed thoroughly about the marginal weather along his route of flight he departed in limited visibility and crashed killing himself and his passenger about an hour and one-half later. It is hard to believe that if the pilot had known the risks associated with spatial disorientation, he would have made the decision to make this flight.

THE INNER EAR

Most problems related to disorientation can be traced to the inner ear, a sensory organ about the size of a pencil eraser. It may well be the most well-protected organ in the human body, and for good reason. It is the key to our ability to balance when on the ground or to remain oriented in space when we fly.

The inner ear is similar to a three-axis gyro. It detects movement in the roll, pitch, and yaw axes that pilots know so well. When the sensory outputs of the inner ear are integrated with appropriate visual references and spatial cues from our bodies, there is little chance to experience disorientation.

The inner ear consists of an auditory and non-auditory portion. The latter, primarily associated with equilibrium, contains the three semicircular canals. The semicircular canals are filled with fluid and are located at approximately right angles to each other. One end of each canal is enlarged and in this area is found a mound of sensory hair cells. Movement or rotation of the body tends to move the fluid of the semicircular canal, thereby causing displacement of the hair cells. The hairs, or cilia, which project into the


ANGULAR ACCELERATION AND THE INNER EAR
The semicircular tubes are arranged at approximately right angles to each other, in the roll, pitch and yaw axes.
Semicircular tubes
Roll
Pitch
Yaw
A sensory organ, which consists of small sensory hairs that project into a gelantinous substance, is located in each tube. When the head starts to turn (angular acceleration), or speeds up, slows down, or stops its turning, the sensory hairs in the tube in the axis of turning are temporarily deflected due to the motion of the fluid lagging behind the motion of the tube wall. This causes the sensation of turning.
Sensory hairs
tube
A
NO TURNING
No sensation
B
START OF TURN
Sensation of turning as moving fluid deflects hairs
C
CONSTANT RATE TURN
No sensation after fluid accelerates to same speed as tube wall
D
TURN STOPPED
Sensation of turning in opposite direction as moving fluid deflects hairs in opposite direction

The Barony chair or "spatial spinner" demonstration helps pilots gain an understanding of how disorientation is induced and how to avoid it.

fluid are extremely fine and light and bend with the fluid's movement. The cilia transmit messages to your brain, telling it which way they are displaced, and your brain figures out the direction of your rotation. Since each canal lies in a different plane, the semicircular canals can report on rotation in three dimensions.

The problem occurs when the outside visual input is obscured, and the seat of the pants input is ambiguous. Then you are down to just the output from the inner ear. That is when trouble can start because fluid in the inner ear reacts only to *rate* of change not a sustained change.

For example, when you initiate a banking left turn, your inner ear will detect the roll into the turn. This system works fine for short turns, but if you hold the turn constant, your inner ear will compensate and rather quickly, although inaccurately, sense that it has returned to level flight. Therefore, if a constant rate turn continues for more than 15 seconds, the motion of the fluid in the canals catches up with the canal walls (stabilizes in the canals), the hairs are no longer bent, and your brain receives false impression that the turning has stopped. *Thus, after a few seconds, it is impossible for your semicircular canals to detect that you are in a turn, especially if it is a gentle turn.*

As a result, when you finally level the wings, that new change will cause your inner ear to produce signals that make you believe you are *banking to the right*. This is the crux of the problem you have when flying without instruments in low visibility weather.

Even the best pilots will quickly become disorientated if they attempt to fly without instruments when there are no outside visual references. That is because vision provides the predominant and coordinating sense we rely upon for stability.

Perhaps the most treacherous thing under such conditions is that the signals the inner ear produces—incorrect though they may be—feel right! These sensory illusions occur because flight is an unnatural environment our senses are not capable of providing reliable signals that we can interpret and relate to our position in three dimensions without visual reference.

As to "risky weather decisions," all pilots should understand that, unless they are thoroughly trained and CURRENT in instrument flying techniques, they are basically *incapable of safely operating in reduced visibility*. The accident statistics attest to this. Unless understanding is brought to the consciousness of every pilot, no substantial reduction in fatal weather accidents is likely to be achieved in the foreseeable future.

In addition, a change of bank, pitch or yaw may be too slow to be perceived by a pilot. In other words, acceleration may be below the threshold of perception. In the course of normal cockpit duties a pilot may be surprised to look up and find the airplane in a bank when it was not previously in a bank.

Although the problem of spatial disorientation is as old as aviation itself, its significance in flight safety is clearly underplayed. For example, in flight training and throughout general aviation a great deal of attention is given to weather and the movement of weather fronts. But little or no mention is made about the connection between weather and spatial disorientation. In the *Pilot's Handbook of Aeronautical Knowledge* (AC 61-23B) the student pilot can obtain a wealth of information on weather. We have made tremendous progress with improving aircraft design, power plants, radio aids and navigational techniques. Safety in flight however, is still subject to conditions of limited visibility. An NTSB study of fatal weather-involved general aviation accidents shows spatial disorientation as a frequent cause. Many of the fatal, weather-involved, general aviation accidents are caused by the pilot's mistaken idea of his or her ability to cope with flight in reduced visibility.

The FAA's *Aviation Instructor's Handbook* (AC 60-14) discusses the desirability of "integrated flight instruction" from the first time each maneuver is introduced. When this training technique is used, instruction in the control of an airplane by outside visual references is integrated with instruction in the use of flight instrument indications for the same maneuver. This handbook states that such instruction

> *"provides the student with the ability to control an airplane in flight for limited periods if outside references are lost. This ability could save the pilot's life or those of the passengers in an actual emergency."*

The real hazard of loss of visual references, i.e., spatial disorientation, is not specifically identified and such identification is important if both pilots and flight instructors are to more successfully deal with this flight hazard. Another source of information is chapter 13 of the *Flight Training Handbook* entitled "Emergency Flight by Reference to Instruments."

REMEMBER !

A flight into reduced visibility or Instrument Meteorologic Conditions (IMC) may be...**LETHAL !!!**

For the opportunity to experience *Spatial Disorientation* for yourself and learn what your limitations are, contact the Accident Prevention Program Manager at your local Flight Standards District Office for a Spatial Spinner (Barony Chair) demonstration in your area. Find out why you CANNOT fly "by the seat of your pants." ■

SURVIVING ON THE GAUGES

Practice in recovering from unusual attitudes is a vital but oft-ignored part of instrument currency

by John W. Conrad

Almost all pilots know the formula for making an airplane go fast. Get the biggest engine you can buy and bolt it onto the front of the slickest airframe you can build. The more horsepower and the less parasite drag an airplane has, the faster it will go in level flight.

Unfortunately, when one of these super-slick airplanes gets into an unusual attitude because of pilot inattention, a meteorological phenomenon, or some kind of equipment failure, the demands placed on the pilot, as well as the airframe, can be extreme. Frequently, one or both fail to meet the challenge.

Accidents involving aircraft that come apart following loss of control in instrument conditions continue to occur. The recent exoneration of the Piper *Malibu* airframe and systems for the rash of in-flight break-ups came with the assumption that the pilots somehow lost control of their aircraft and then were unable to recover without destroying the aircraft in the process.

There is also a body of evidence to support the opinion that many of the aircraft that are "destroyed" by thunderstorms each year are really destroyed when the pilot lost control and, in the NTSB's parlance, "exceeded the design stress limits of the aircraft" while attempting to regain control.

Most pilots have a brief encounter with unusual attitude recovery during the first phase of their instrument flight training. Those who have received their instrument ratings since the FAA implemented the practical test standards have been required to demonstrate their ability to recover from unusual attitudes by reference to the instruments during their practical tests.

Normally this is the end of it. There is no requirement for recurrent training in recovering from unusual attitudes on the gauges. So, if an instrument pilot remains current for 10 years, he or she may have flown at least 120 hours of instrument time and may have made at least 120 instrument approaches, but that pilot probably will not have had to practice at all in recovering from unusual attitudes.

Think about it. When was the last time you practiced? Do you think you could recover from an in-flight "upset" solely by reference to the instruments now, if you really had to?

Imagine yourself in the following situation: You are flying along in the clouds with the aircraft on autopilot, and, being a conscientious instrument pilot, you decide to study the missed approach procedures for your destination. You see that the procedures for the approach you expect to shoot are complicated. They will require you to reset both navigation radios and both omni-bearing selectors, and then weave your way out to a holding pattern. You cannot quite figure out how you are supposed to enter that holding pattern once you get there.

After a few moments of study, you glance up at the attitude indicator, and it looks strange. The heading indicator is spinning like a top. The turn coordinator is banked all the way to the left. The needle on the airspeed indicator is moving rapidly toward the red line. The VSI indicator is stuck at the three o'clock position. The altimeter is unwinding quickly. What are you going to do.

No Time to Wonder

In such a situation, you would not have the luxury of thinking for a moment about what to do. Because a moment would be all you would have. In a moment, the airplane you are sitting in is going to exceed its design limitations and, perhaps, come apart.What would you do, then?

The very first thing you *mus*t do is close the throttle or throttles. Unfortunately, most pilots of high-performance and turbo-charged aircraft are reluctant to do this. We have been told time and time again that abrupt throttle closures can destroy the engine. The pilot who has just plunked down 20 grand for an overhaul will certainly be reluctant to do the dirty deed, but it must be done. Reducing power will only slow the acceleration of the aircraft; closing the throttles will actually add a bunch of drag from the windmilling propellers.

If you are debating the prudence of this course of action in your mind as you read this, then you may be an accident waiting to happen. In any aircraft, any time, if the airspeed is building rapidly and nearing Vne, the first step is to close the throttle. Period. End of discussion.

The next step is to level the wings. Do not begin to add back pressure before you begin to roll the wings level. Look

at the turn coordinator to determine the direction in which to roll, and then compare the turn coordinator to the attitude indicator to see if it is still working or if it has tumbled.

Remember, a level turn at only 60 degrees of bank imposes twice the force of gravity on the airframe. It is better to level the wings first so that all airframe G loadings will be used to bring the nose above the horizon, as opposed to just pulling the airplane around the turn.

Once the wings are level, there comes the judgement call as to how much G-loading to put on the airframe as the nose comes up. Because the aircraft was trimmed for a specific airspeed before it entered the spiral, the trim mechanism will be pulling the nose up even if you do not pull back on the yoke at all, once the wings are level. In this situation, do not put more than two G's on the airframe. That is the feeling you get when making a 60-degree bank, level turn. (When was the last time you did one of those? Have you even tried one in the clouds with an instructor on board?)

Once you get the aircraft back under control, you can restore power and worry about the overhaul later. A thorough inspection of both the airframe and engine is warranted following an event such as this.

Lower the Gear?

Some advocate lowering the landing gear in an extreme nose-down unusual attitude such as this because the extra drag could blunt acceleration and stabilize the aircraft somewhat. But, after considering the pro's and con's, it may not be a good idea.

One consideration is that you are going to do some structural damage to the landing gear doors if you lower the gear at near red line airspeed. But, like worrying about engine damage from shock-cooling, it is not something that should occupy a pilot's mind when he or she has only a moment to regain control of an aircraft.

A much more important consideration is that the torsional loads on the spar during the gear extension might prove to be the downfall of the structure.

Regardless of your choice in the landing gear matter, it is important that you have your mind made up and the exact procedure committed to memory before the event occurs. Furthermore, you must have practiced the maneuver repeatedly so that it is ingrained in your mind. There is simply no time to weigh the options and make an intellectual decision in the actual situation. You must react, and react correctly.

A contributing factor in this particular scenario is the pilot's inability to hear the noise of the air flow building. If you have pride in a quiet cabin, if you have installed one of those door seals which you can pump up with a bulb, if you wear noise-canceling headsets, you may have already set yourself up for a fall because you have eliminated one of the first indicators of excessive airspeed, the roar of the wind.

A good example of this occurred in a Cessna P210 during some dual instruction. The owner had installed the finest headsets money can buy. Furthermore, the pilot also had installed a automotive type compact disc player to pipe music into the headsets. The instructor managed to get the pilot distracted during Wagner's rousing "Ride of the Valkyries," and the pilot had no idea the airspeed was building as the airplane wound itself into a spiral. Had the pilot been without all the audio accessories, the pilot may have sensed the problem much sooner.

Some pilots use headsets that only cover one ear. Through the uncovered ear, you can hear wind noise, the engine noise, and what the passengers are doing. There is nothing against music, but when flying a pilot should concentrate all of his or her senses on the job at hand. End of sermon.

Herding a Runaway

Though a nose-down unusual attitude is the most common, and the most deadly, we should be able to correct for a nose-up unusual attitude also.

Because of the aerodynamic balance of the lifting surfaces on an aircraft, a nose-up unusual attitude is not particularly critical. If the airplane is pulled up into a nose-high attitude, all that needs to be done is to release the pressure on the controls, and the nose will immediately begin dropping. Soon, you will be able to recover from a nose-low unusual attitude.

An uncommanded and unexpected nose-up attitude caused by runaway elevator trim is another matter entirely. Even though most general aviation aircraft cannot be trimmed into a full stall, the sudden application of lots of nose-up trim can result in the aircraft being pulled into a near-vertical climb. [Editor's note: The sudden application of a great deal of nose-up trim with a full power setting is the usual situation that results in a near-vertical climb.] Should this happen, rest assured the airplane will not climb for long, and when the nose pitches down, you can be set up for a high-airspeed situation. Hence, it is important to know how to deal with an extreme nose-up situation.

Here is a question to test your understanding of the aerodynamics involved: If an airplane stalls at 60 knots with the wings level and at 100 knots in a 60° bank turn, then at what airspeed will the airplane stall if the flight controls are pushed forward and the airplane is "unloaded" to zero G's?

The answer is zero. The airplane will not stall at all. When an airplane is in a weightless situation, the wing needs to produce no lift. Hence, all other aerodynamic bets are off.

So, if you discover yourself in an extreme nose-up situation, in order to avoid a stall and further loss of control, the proper technique is to unload the airplane. In other words, push the nose over so smartly that the things inside the airplane start to float. Though this feels very uncomfortable to everyone on board, the maneuver itself actually imparts less stress on the airframe than level flight. This procedure is adequate for non-turbine powered aircraft but you may flame out the engine in a turbine as positive "G's" are required to ensure adequate fuel flow.

Nose Up, Pitch First

In light of this, when faced with a situation where the nose of the aircraft is way above the horizon, it is important to take care of the pitch first and then worry about the bank. If you try to correct the roll problem first, as you would in a nose-down situation, you could inadvertently stall the airplane and do a half snap roll to the inverted.

You will notice that we have made no recommendations as to the use of power in an extreme nose-up situation.

That is because power may make little difference in this type of extreme pitch up situation. The difference in pitch between where an airplane will stall at cruise power and where it will stall at full power is seldom more than five or 10 degrees. [Editor's note: The Instrument Flying Handbook, AC 61-27C, as well as industry practice recommends an increase in power—as necessary—during a nose-high recovery from an unusual attitude.]

On the other hand, if you encounter an extreme nose-up pitch when at reduced power, such as when on approach, full power should be immediately applied. But this is a very natural reaction and does not require much retraining or practice. In times of stress, we tend to be quick to apply full power and slow to close the throttle.

If you have never experienced a runaway trim condition, try it sometime on a training flight with a competent instructor. Roll the elevator or stabilator trim all the way back and try to keep the airplane level. Then try it the other way. You will be amazed how much force is required to fly the airplane.

Practical Practice

Now, to the crux of the problem with unusual attitude training: How does one practice these important procedures without doing damage to one's airplane? The simple answer is that one does not. One does it in someone else's airplane. There is absolutely no reason why you should shock-cool the expensive turbocharged engine in your A36TC *Bonanza* when you can rent a relatively inexpensive Beech *Sierra* with a nearly bulletproof, normally aspirated Lycoming engine.

Likewise, if you fly an expensive twin, you can rent a normally aspirated twin trainer like a *Duchess*, *Travelair, Seneca I, Aztec*, or *Apache*. These airplanes are powered by engines that have held up relatively well to rough handling in countless instructional hours, so you should not have to feel too guilty about how you manage the throttles.

No Questions

Remember, in a time of crisis, your mind will not care if you learned your procedures in a *Baron* or *Duchess*, a *Bonanza* or *Sierra*. The important thing is that you have learned the procedures and committed them to memory. There should be no question in your mind as to what should be done and when.

If it has been several years since you practiced unusual attitudes, you need to get some recurrent training. If the airplane you fly will not take kindly to that kind of treatment, then rent an airplane that will. Flight review and instrument competency checks provide an opportunity to get this type of training. But it is almost always up to the pilot to take the initiative and suggest that such practice be accomplished.■

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A Case for Aerobatic Training

One hesitates to broach the subject of aerobatic flight training in a safety magazine. Although some believe that aerobatic flight training will make a pilot safer, we certainly cannot tell you that flying an airplane upside-down or doing loops, rolls, and spins poses no more risk than doing climbs, turns, and glides on the way from point A to point B. There is an obvious reason why you are required to wear a parachute when doing aerobatics. Maybe we should look at this type of venture as a component of the aviation safety stock market. Aerobatic flight instruction represents exposure to an acceptable amount of risk in order to receive a considerable return on the investment.

If you have never experienced aerobatic flight, you do not know what to expect when an aircraft departs from "normal" maneuvers. You do not know how an airplane will behave when it is rolled beyond 60 degrees of bank or when the nose is pitched up or down more than 30 degrees. Beyond all of this, you do not know what it feels like to be in an airplane when these maneuvers are being performed. As a result, should you ever have to perform an aerobatic maneuver [to recover from an unusual attitude], you are likely to do the wrong things.

If a pilot has performed point rolls and sustained inverted flight, he or she knows what these maneuvers feel like inside the cockpit. The experienced pilot knows what control inputs are required to put the airplane right-side-up again with a minimum loss of altitude. Perhaps more importantly, the aerobatic pilot knows that an airplane can be rolled upside-down without breaking. The pilot knows that to be slammed against the seat belt, in this case, is a confirmation that the right things are being done.

For example, an aerobatically knowledgeable pilot who is rolled inverted on final approach by a wing tip vortex has a much better chance of surviving the incident than one who has never been upside-down in an airplane. It is as simple as that. In order to keep the airplane "feeling right," the uneducated or inexperienced pilot may allow the airplane to split-S into the earth. The pilot who has never slammed the controls over to the stop in order to get an airplane rolling is unlikely to do it on the first try.

There are many things that can force a pilot into the realm of aerobatic flight. An encounter with a building, embedded thunderstorm cell which is too small to paint on the radar can turn an airplane upside-down in an instant. A runaway trim can require a spin recovery. Severe turbulence, by definition, can push an airplane past its normal limits. Certainly, the loss of control in instrument conditions can cause a pilot to use everything he or she knows about how an airplane reacts to the forces of flight. Without the knowledge and skill that aerobatic training can impart, a pilot may be left with only luck to survive an upset.

If you consider getting some aerobatic flight training, choose a reputable school with good equipment. Explain your goals to the instructor. Steer clear of anyone who wants to "impress" you. Make your selection carefully and you should get a very good return on your investment.

—John Conrad

The Tuskegee Airmen
Courage on Two Fronts

(Above) Base commander James Ellison inspects some of the first cadets at Tuskegee Air Field in Alabama. The 99th Fighter Squadron was activated as a black unit in March 1941. USAF photo.

(Left) In Italy, near one of their P-51's, are (left to right) Lt. Dempsey Morgan, Jr.; Lt. Carroll Woods; Lt. Robert Nelson, Jr.; Capt. Andrew Turner, commanding officer of the 100th Fighter Squadron; and Lt. Clarence Lester, who had three enemy fighters to his credit.

by Joshua E. Hochberg

We have celebrated Black History Month in the public and private sectors for many years, but FAA Aviation News *has never addressed black aviation history at any length. We have published the occasional article on African-American aviators; e.g., Bessie Coleman (January/February 1983). There is a particular group of African-American airmen who deserve more than cursory attention, and they would deserve this attention anyway for "the content of their character" and not for the color of their skin. The fact that Axis aircraft were not the only enemy they had to fight meant they had to conquer on two fronts, an occasion to which they rose mightily. In spite of misguided notions that said they could not fly, they flew, and they helped to ensure the liberties they were sometimes denied.* ***—Editor***

During World War II U.S. soldiers, sailors, and airmen all possessed a degree of courage, but some had to have more than others. Courage was one of the greatest attributes displayed by the members of the 332nd Fighter Group during that conflict nearly 50 years ago. The members of the 332nd needed more courage than most. Why? They had to fight two wars: one against racism in the United States before they were permitted to fight the Axis. The 332nd Fighter Group was composed entirely of African-American airmen.

All the squadrons of the 332nd Fighter Group were collectively known as the "Tuskegee Airmen"—the first black pilots to fly for the U.S. military. Yet, to achieve this status, they had to overcome much adversity at home in order to fight for freedom abroad.

Offering excuses which may have amounted to racism and bigotry, many in the military refused to let blacks fly in defense of freedom. As noted in the Smithsonian Institution publication, *Segregated Skies*, some said that "the level of intelligence and occupational skill of the Negro population is considerably below that of the white. . ." Therefore, "experiments within the Army in the solution of social problems are fraught with danger to efficiency, discipline, and morale." Others said that blacks had an "apparent lack of inherent natural mechanical ability." All of these were the same old, tired,

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Walter Scott

During a visit to Tuskegee in 1941, First Lady Eleanor Roosevelt agreed to an impromptu flight with Chief Anderson in a Piper Cub, surprising people across the country (although she had secretly taken flying lessons from Amelia Earhart). Her flight with Anderson was said to have helped end the exclusion of blacks from the Army Air Corps.

unproven arguments that had been used to deny rights to many individuals over the years, but the Tuskegee Airmen, and a closer look at some closed chapters of history, were to demonstrate just how false they were.

Those who said blacks were not fit to fly must not have been acquainted with black history or aviation history for that matter, where black Americans already had provided a rich contribution. It all started in 1922 when Bessie Coleman became the first licensed black pilot in the United States. (Of course, she had to go to France to learn how to fly, since no U.S. flying schools would accept her.) Her short career as a barnstormer inspired other blacks to become involved in aviation. Shortly after her tragic death in 1926, a group led by William J. Powell organized the Bessie Coleman Aero Clubs to promote aviation in the black community. There were several such clubs that trained black youngsters in aviation fields. The clubs also held airshows featuring black pilots to generate greater interest in aviation among everyone.

The book *Air Facts and Feats* notes that the first coast-to-coast crossing of the U.S. occurred in 1921. Nowhere does it indicate that in 1932 James Benning and his mechanic became the first blacks to make a transcontinental flight across North America in a flight time of 41 hours, 27 minutes. In 1933 C. Alfred Anderson and Dr. Albert E. Forsythe made the first round trip transcontinental flight by black pilots, flying from Atlantic City, NJ to Los Angeles, CA and back. Anderson and Forsythe set out in 1934 on a Pan-American goodwill flight in their airplane, the "Spirit of Booker T. Washington." The first leg was from Miami to Nassau, the first time that had ever been accomplished by a land airplane. The journey then continued to Cuba, Jamaica, Haiti, the Dominican Republic, Puerto Rico, the Virgin Islands, Grenada, Trinidad, and Guyana where, because of a mishap which damaged the "Spirit of Booker T. Washington," the trip came to a premature end. Even though the flight ended early, Anderson and Forsythe achieved their goal of inspiring black youth through aviation.

The tremendous accomplishments of blacks in aviation along with some good lobbying efforts helped to convince the government that blacks, too, could fly airplanes. In 1938 the government put more black people on the road to becoming pilots with the possibility of entering military service; President Franklin Roosevelt announced that $100,000 had been allocated to finance the flight training of 25,000 college students through the Civilian Pilot Training Program (CPTP). The students trained through the CPTP were supposed to make up what would amount to a reserve group of pilots for the U.S. if world events led to a war. In all, 400,000 pilots were trained through the CPTP, and 2,700 of them were black.

Most black students in the CPTP were trained at West Virginia University, Tuskegee Institute (Alabama), Delaware State College, Hampton Institute (Virginia), Howard University (Washington, DC), and North Carolina Agricultural and Technical State College. All of these schools started out being authorized for primary instruction by the Civil Aviation Authority (CAA—predecessor to the FAA), but, because of its students' records at the primary level, Tuskegee was the only black institution authorized for secondary training.

Given the training record and the students' performance, the arguments presented by the military no longer held any credence. After much struggle, and with a great deal of opposition still from high-ranking military officials, blacks earned the right to "proportionate shares in all branches of the Army, in the proper ratio to their population." With Tuskegee's history of excellence in aviation training, it was chosen as the main training location for black military pilots.

On March 21, 1941, the 99th Pursuit Squadron of the 332nd, a segregated, all-black squadron, was officially activated. The students of the 99th used existing Tuskegee Institute facilities before being moved to the new Tuskegee Army Air Base. They were trained under Col. Noel Parrish, a white officer, before the 99th was taken over by the legendary Col. Benjamin Davis, Jr., its first black leader and son of the only black general in the U.S. Armed Forces.

The United States entered World War II on December 8, 1941, but it was not until April 23, 1943 that the 332nd, after a long and arduous training process, arrived overseas. They had boarded a train in Tuskegee, AL amid hoards of well-wishers and other onlookers and began the long journey to war. The first stop was Camp Shanks, NY, their port of embarkation. They remained there for 10 days for processing until, on April 15, they boarded a boat with white soldiers and sailed for Africa. Whether any noted the irony of sailing to their ancestral home to fight for freedoms they were not assured of in the U.S. it not known, but eight days later they disembarked in Casablanca, Morocco. Their tour of combat duty was about to start.

The 99th downed its first enemy aircraft on July 2, 1943. While they were escorting home 16 B-25 Mitchell bombers after a bombing run off the

Sicilian coast, German fighters attacked. Through some expert flying, Lt. Charles Hall of Brazil, IN sent the first "kill" plummeting to the ground. This accomplishment brought a visit and personal congratulations from none other than the commander of American forces in North Africa, Gen. Dwight D. Eisenhower. With Eisenhower were Army Air Force Lt. Gen. Carl Spaatz and Maj. Gen. James "Jimmy" Doolittle.

The Tuskegee Airmen received many commendations for what they considered doing their job: shooting down enemy aircraft. Their glory came from more astounding feats. One day while on a strafing run over the Mediterranean, the Airmen stumbled across a German ship. Armed only with their aircrafts' machine guns, they attacked, and, to everyone's astonishment, destroyed the vessel. Few believed their reports until the film from the aircrafts' cameras was developed.

Among its ranks the 332nd was blessed to have Lt. Clarence D. "Lucky" Lester. Lucky Lester was "lucky" enough to score three kills in one day. Like any pilot telling a "war story," Lucky exuberantly recalls the day in the publication *Black Wings:*

"It was a clear day in July 1944 when the P–51 Mustangs *of the 332nd Fighter Group took off from our airfield at Ramitelli, Italy. Our mission was to rendezvous over northern Italy's Po Valley at 25,000 feet with B–17* Flying Fortresses *enroute to bomb a German airfield in southern Germany. We had been given the task of escorting the bombers to the target and back. . . .*

"We relished the assignment since it allowed us to conduct a fighter sweep, which meant we provided general cover but had no specific groups of 'Forts' to protect. I flew with the 100th Fighter Squadron. The name 'Lucky' stuck because of all the tight situations from which I had escaped without a scratch or even a bullet hole in my aircraft.

"The rendezvous was made on time at 25,000 feet. . . . The other squadrons of the 332nd began their close cover at 27,000 feet. We were around 29,000 feet when bogeys [enemy aircraft] were spotted above us.

"We were flying a loose combat formation, 200 feet apart and zigzagging. . . . At this time I saw a formation of Messerschmitt Bf 109's straight ahead, but slightly lower; I closed to about 200 feet and started to fire. Smoke began to pour out of the 109 and the aircraft exploded. I was going so fast I was sure I would hit some of the debris. . . but luckily I didn't.

"As I was dodging pieces of aircraft, I saw another 109 to my right, all alone on a heading 90 degrees to mine, but at the same altitude. I turned onto his tail and closed to about 200 feet while firing. His aircraft started to smoke. . . . My closure was so fast I began to overtake him. When I overran him, I looked down to see the enemy pilot emerge from his burning aircraft. I remember seeing his blond hair as he bailed out at approximately 8,000 feet.

"By this time I was alone and looking for my flight mates when I spotted the third 109 flying very low, about 1,000 feet off the ground. I dove to the right behind him and opened fire. As I scored hits, he apparently thought he had enough altitude to use a 'split-S' maneuver to evade me. [A 'split-S' is a one-half loop going down; the aircraft is rolled upside down and pulled straight through until it is right side up—not recommended below 3,500 feet.] We were approximately 1,000 feet above the ground and, as I did a diving turn, I saw the 109 go straight into the ground.

"During the return flight, it took a while to realize how much had happened in that brief span of time of about 4–6 minutes. Everything went the same as in training except for the real bullets. Real bullets!! Until then, the danger of this mission had never occurred to me."

Original 99th Fighter Squadron at Tuskegee with its leader, Col. Benjamin O. Davis, Jr., front and center.

Each Tuskegee Airman has his own story to tell, and as a group the 332nd was well-decorated. Their outstanding and courageous achievements did much to benefit blacks at home then and for decades after. As Spann Watson, a surviving Tuskegee Airman and the first black pilot employed by the FAA, says, "There has been no other event in America that changed the feelings of whites towards blacks" as much as the creation and accomplishments of the Tuskegee Airmen.

Before the Tuskegee Airmen, there was a strong sentiment in America that blacks could not handle complex tasks as well as whites could. The Tuskegee Airmen completely dis-proved such racist ideas. They were simply a group of soldiers who did their job—just like the thousands of others in World War II. The courage of the Tuskegee Airmen not only helped the Allies defeat the Axis in World War II, it also helped African-Americans win a battle in the war for racial equality in the United States. ■

Mr. Hochberg is a student pilot (perhaps a private pilot by the time you read this) who interned this past summer in the General Aviation and Commercial Division as part of the FAA's "Stay in School" program. He is currently in his senior year of high school in New Jersey, deciding on which college or university has the best aviation program for him.

A Rocky Mountain Mile-High Airport

Denver's New Airport Brings Airspace Changes

by Dean Chamberlain, *Associate Editor*

You know how hard it is to move an aircraft at some airports. But did you ever think how hard it is to move an airport? After all, you cannot just taxi it down the road. But during October 1993, Denver, Colorado will move its international airport about 10 miles. According to the master plan for the move, one minute (23:59 October 30, 1993, if all goes according to plan) its main airport will be Stapleton International Airport; the next minute (midnight) its main airport will be the new Denver International Airport. (Stapleton will be closed.) The complete transition process may take up to 24 hours.

As anyone who has moved from one house to another will tell you, moving is not easy, especially if you have to build the house you are moving into. Now try moving to a new 53-square mile airport you also have to build. That is exactly what Denver, the airlines, and the FAA is doing. The new airport is one of the largest construction projects in America.

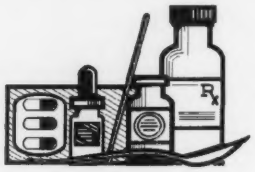
The reasons for building the new airport are the lack of aircraft capacity and the number of weather delays at Stapleton. The new airport's 206 aircraft gates should take care of the capacity problem, and the ability to conduct three parallel, instrument approaches to some of its planned 12 runways should minimize weather delays. Five runways should be operational on opening day. Another one should be operational a year later. The remaining runways are included in the airport's future plans. With the scheduled October 1993 opening of the new multi-billion dollar airport fast approaching, pilots can start seeing the major changes coming for all airmen flying into and through the Denver area. Some of those operational changes at nearby airports will occur between now and the new airport's opening day, but most of the changes will occur on opening day. Because of the number of changes being made in the region, including a new terminal control area (TCA) design, all pilots operating within the Greater Denver area need to operate with current charts and keep up with all NOTAM's issued about the area. New VFR and IFR charts will become effective on the opening day of the new airport. The Denver, Cheyenne, and Wichita sectionals and the Denver TCA chart will be changed. Because of the many IFR procedural changes that will be made within the Denver region such as dozens of new intersections, airway segments, and a significant number of new approaches and departures that have to be made as a result of the restructuring, and the many old intersections and IFR procedures that will be canceled, all of the IFR charts for the area must be changed. All of the IFR chart changes are planned to be effective on opening day. At that time, all of the current charts based upon Stapleton will expire. As a result of all of the chart changes that will occur on opening day, VFR and IFR pilots need to read the expiration and effective dates on their respective charts. Some VFR charts' expiration dates may be extended to cover the transition period. IFR pilots should receive two IFR charting updates for the Denver area prior to opening day. One package will be the normal IFR distribution showing current procedures and any changes for Stapleton with a notation that the charts will expire upon the opening date of the new airport. The second package will be the new charts which will be effective on the opening date of the new airport.

In addition to the changes taking place within the Greater Denver area, many of the changes affect operations outside of the Denver area. Instrument approach information and procedures will also change at about 20 airports both within and outside the state of Colorado. Some of the changes are because of the four new VOR's being installed in the Denver area to support the new airport. Two of those VOR's will be installed on the new airport. One, MILE HIGH (114.7), is already operational. The other VOR will become the new DENVER (117.9) VOR when the new airport opens. The current DENVER VOR at Stapleton will cease operation when the new DENVER VOR becomes operational. The third VOR, FALCON (116.3), is now operational about 10 miles south of the new airport. The fourth new VOR, JEFFCO (115.4), at Jeffco Airport on Denver's northwest side, should be operational before opening day. In addition to the new VOR's, both the high and low altitude airways serving Colorado will also be changed to accommodate traffic flow in and through the Denver area.

VFR pilots need to pay particular attention to the many changes in the Denver area. Although all of the general aviation airports will be accessible without a pilot having to enter the new TCA, VFR pilots will still have to study the new TCA chart to ensure a safe flight in the Denver area and to avoid entering the TCA without authorization. To help VFR pilots navigate in the area, current plans call for the new Denver TCA chart to include designated flyway routes on its reverse side. Flyways, for pilots not familiar with them, are published routes outside or underneath TCA airspace designed to help VFR pilots navigate without having to enter the TCA or contact air traffic control (ATC). Pilots desiring to enter the TCA must following appropriate ATC procedures.

This is the first of several articles about the new Denver airport and the changes that will take place as a result of the new airport. The best way to prepare for the changes is by using current charts and reviewing the latest published and electronically transmitted NOTAM's. ■

Medical Stuff



Over the Counter Medications and Flying (maybe you shouldn't...)

A commonly held belief is that medicine cures all that ails. However, whether medicine is prescribed by a doctor or is an over-the-counter medication that you have selected, as a pilot you must consider the effect it will have on your performance. When you are given a prescription, your doctor explains the possible side-effects of the medication you are about to take. Your pharmacist also outlines them when filling the prescription. But when you treat yourself with a non-prescription medication, you become your own doctor and pharmacist. Therefore, you must inform yourself of the possible adverse reactions that you might encounter. The following will help you understand some of the basics that you will need to successfully accomplish this task.

OTC's Defined

Over-the-counter medications (OTC) are any legal, non-prescription substance taken for the relief of discomforting symptoms. This may include capsules, tablets, powders, or liquids.

Underlying Medical Condition

When you are not feeling well, your best action is to ground yourself and wait until you have recovered before resuming your pilot duties. There may be times, however, when you feel that you must fly and will be tempted to doctor yourself with an OTC. At these times it is good to remember that the OTC only hides your symptoms for a while. They do not usually "cure" the condition, and you will not be at peak physical performance while you fly.

Problems with Medications

There are two main areas of concern about unwanted reactions to medications.

1. Possible Allergy

Allergy is a rare and unpredictable reaction to a substance. If you know that you are allergic to something, you should carefully read the list of ingredients of any OTC to assure that none of the substance is included in its formulation.

2. Possible Unexpected Side-Effects

These can take many forms, including drowsiness, impairment of judgement, upset stomach or bowels, disturbance of vision, or even itching. Any of these could cause an impairment that might lead to incapacitation while flying.

Decongestants and caffeine (contained in coffee, tea, cola, chocolate) are both strong stimulants in some individuals. Mixed together, they can make you "hyperactive." Note that some cough syrups contain a decongestant.

MEDICATION AND FLYING

At 6:07 pm PST, February 1, 1991, 34 passengers and crewmembers were killed when two planes collided on runway 24L at Los Angeles International Airport (LAX). One plane, Skywest Flight 5569, a Fairchild Metroliner (SA-227–AC), had been cleared to taxi into position and hold on 24L at Intersection 45. The other aircraft, USAir Flight 1493, a Boeing 737–300 (B–737), had been cleared to land on 24L. The resulting crash killed all 10 passengers and two crewmembers on the Metroliner and 20 passengers and two crewmembers on the B–737.

In an interesting side issue, toxicological tests of the USAir captain's body indicated the presence of a medication that had been prescribed by the USAir captain's personal physician. The National Transportation Safety Board said, "The presence of the medication in the captain at the time of the accident indicates that he had used it shortly before flying, contrary to the instructions of his physician and FAA requirements. He failed to report his use of any medication to his FAA Aviation Medical Examiner." The report also said, "Specimens taken from the first officer of SKW5569 revealed the presence of substances found in typical over-the-counter medications. The presence of these substances again raises the question concerning the frequency with which pilots self-medicate shortly before flying."

Pilots need to be candid with their aviation medical examiners regarding any pilot illness or use of either prescription or over-the-counter nonprescription drugs. Pilots can review FAR § 61.53 for example, and the AIM, Chapter 8, Medical Facts For Pilots, concerning medical deficiencies and the use of medication while flying. Pilots should contact their aviation medical examiner regarding any illness or use of medication before flying. ■

This table lists the common OTC's and outlines some of their possible side-effects that could affect flying abilities. As with all drugs, side-effects may vary with the individual and with changes in altitude and other flight conditions.

MOST COMMONLY EXPERIENCED SIDE EFFECTS AND INTERACTIONS OF OTC MEDICATIONS

	MEDICATIONS	SIDE-EFFECTS	INTERACTIONS
PAIN RELIEF/ FEVER	ASPIRIN Alka-Seltzer Bayer Aspirin Bufferin	Ringing in ears, nausea, stomach ulceration, hyperventilation	Increased effect of blood thinners
	ACETAMINOPHEN Tylenol	Liver toxicity (in large doses)	
	IBUPROFEN Advil Motrin Nuprin	Upset stomach, dizziness, rash, itching	Increased effect of blood thinners
COLDS/ FLU	ANTIHISTAMINES Actifed Drixoral Benadryl Nyquil Cheracol-Plus Chloritrimetron Contac Sinarest Dimetapp Sinutab Dristan	Sedation, dizziness, rash, impairment of coordination, upset stomach, thickening of bronchial secretions, blurring of visions	Increased sedative effects of other medications
	DECONGESTANTS Afrin Nasal Spray Sine-Ald Sudafed	Excessive stimulation, dizziness, difficulty with urination, palpitations	Aggravates high blood pressure, heart disease, and prostate problems
	COUGH SUPPRESSANTS Benylin Robitussin CF/DM Vicks Formula 44	Drowsiness, blurred vision, difficulty urination, upset stomach	Increased sedative with effects of other medications
BOWEL PREPARATIONS	LAXATIVES Correctol Ex-Lax	Unexpected bowel activity at altitude, rectal itching	
	ANTI-DIARRHEALS Imodium A-D Pepto-Bismol	Drowsiness, depression,blurred vision *(See Aspirin)*	
APPETITE SUPPRESSANTS	Acutrim Dexatrim	Excessive stimulation, dizziness, palpitations, headaches	Increases stimulatory effects of decongestants, interferes with high blood pressure medications
SLEEPING AIDS	Nytol Sominex	*(Contains antihistamine)* Prolonged drowsiness, blurred vision	Causes excessive drowsiness when used with alcohol
STIMULANTS	CAFFEINE Coffee, tea, cola, chocolate	Excessive stimulation, tremors, palpitations, headache	Interferes with high blood pressure medications

Summary Advice

- READ and follow label directions for use of medication.
- If the label warns of side effects, do not fly until twice the recommended dosing interval has passed. So, if the label says, "Take every 4-6 hours," then wait at least 12 hours to fly.
- Remember, the condition you are treating may be as disqualifying as the medication.
- When in doubt, ask your physician or Aviation Medical Examiner for advice.
- As a pilot, you are responsible for your own personal "preflight." Be wary of any illness that requires medicine to make you feel better.
- If an illness is serious enough to require medication, it is also serious enough to prevent you from flying.
- Do not fly if you have a cold—changes in atmospheric pressures with changes in altitude could cause serious ear and sinus problems.
- Avoid mixing decongestants and caffeine.
- Beware of medications that use alcohol as a base for the ingredients.

This article is based on the pamphlet, "Over the Counter Medications and Flying," published by FAA's Civil Aeromedical Institute (CAMI). CAMI is the medical certification, research, education, and occupational health wing of the FAA's Office of Aviation Medicine. For copies of the pamphlet, write to CAMI, Aeromedical Education Division, AAM–400, P. O. Box 25082, Oklahoma City, OK 73125.

Hospital-based Emergency Medical Evacuation Services

by Phyllis A. Duncan, *Editor*

Dedicated to the EMS pilots, mechanics, flight nurses, doctors, paramedics, emergency medical technicians, and other personnel whose hard work and commitment have saved countless lives.

On a slick, rain-wet highway, a paramedic works frantically to stabilize the victim of an automobile accident. The patient has head injuries, and the paramedic knows her efforts will be for nought unless the victim is hospitalized immediately. But the nearest trauma center is one hour away by ambulance.

In the aftermath of a snowstorm that has closed the secondary roads, a woman on a remote farm goes into premature labor. When the baby is born, its chances of survival are slim unless it can be rushed to a neo-natal center some 150 miles away. But the roads will not be plowed open for hours or even days.

A middle-aged man who has suffered a heart attack arrives at a small, rural treatment center but needs to go to the cardiac care unit of a hospital in the next state. Unless he soon receives appropriate care, cardiac arrest is likely, but the CCU is a half a day's trip by ambulance.

Is the above the *TV Guide* description of an upcoming episode of "Rescue 911?" No, they are simply examples of the dilemmas health care providers face everyday. For many years the outcomes of such emergencies were not the uplifting ones shown on supposedly truth-based television programming. Because an essential piece of medical equipment was not available, the accident victim, the premature baby, and the cardiac patient would have died in that first "golden hour" of opportunity that health care givers tell us is so important to recovery from trauma. That "essential piece of medical equipment" is the helicopter.

"M*A*S*H" and "China Beach"

Those of us who watched the Vietnam War from our living rooms became accustomed to the sight of wounded soldiers who had been initially stabilized on the battlefield by medics and then flown by helicopter to special medical units for life-saving surgery. Many a helicopter medevac pilot received medals and commendations for rescues and transportation under fire, but the helicopter's use for mercy missions as well as for combat goes back to its very beginnings in

World War II and the Korean Conflict. This usage was popularized by Hollywood in American culture by television programming such as "M*A*S*H" in the 1970's and "China Beach" in the 1980's.

It was only natural, then, as more and more civilian uses evolved for the helicopter, that it should be pressed into service as an "air ambulance." In the early 1970's the occasional use of a police or military helicopter to transport an accident victim became a full-fledged industry. Transportation of patients via helicopter moved out of the public sector to the private sector, where FAA-certificated air taxi operators provided the service for a fee.

Airplanes Were First but not Always Best

Aircraft and medical assistance have long mixed. In World War II, many airplanes that were to enjoy a post-war heyday in civilian flying, were used to move wounded soldiers from the front lines to hospitals and recovery centers a "safe" distance away. (If not for the C-47 (similar to the DC-3) that brought my father—cocooned in a full body cast—home strapped to its floor, you might not be reading these words under my byline today.) The term "medevac" was coined in the Korean Conflict era when front lines were less easy to define, and, as a result, hospitals were very far away or on ships offshore.

In civilian medical evacuation, airplanes were also the first to be used, but they soon showed their limitations in terms of size and versatility. Airplanes needed a runway or a sizable open field (preferably free of woodchuck holes and rocks) to operate in and out of. This was not a problem provided the accident or medical emergency occurred next to a convenient airport or a long, straight piece of highway. Helicopters could take off and land in a space many times smaller, often right next to the accident or emergency site. Most of the airplanes readily available for civilian medevac use were smaller than the venerable DC-3, and their size and weight-bearing capacity left little room for anything except a stretcher or litter and no adequate door to allow its ingress or egress, much less an accompanying nurse or doctor and his or her equipment. Helicopters had these wonderfully large doors that swung or slid out of the way, and they had been combat-designed to carry substantial loads, like gurneys and other medical equipment as well as personnel. Helicopters could also be landed on hospital rooftops or nearby parking lots, unlike airplanes, which required an ambulance ride from the airport.

Airplanes still remain the call for long-distance flights cross-country or across several states and especially for the transport of organs for transplantation, but for the short-haul trips for rapid emergency care or ease of patient transfer, helicopters seem made for airborne emergency medical service.

Genesis of an Industry

In the 1970's and 1980's conditions in the U.S. were ripe for this offshoot of the helicopter industry. For some time we had seen helicopters used in police work, in traffic spotting, in offshore oil-rig transport, in fire fighting, but there were several factors which inevitably led to the civilian helicopter medevac industry.

First, there were large numbers of Vietnam-era medevac pilots who had witnessed firsthand the benefits of evacuating patients by helicopter. Eager to keep flying in the only business many of them knew and most of them loved, they were a workforce waiting to be tapped. Second, Vietnam had also proved the helicopter's versatility and durability and had inspired manufacturers to design and build larger turbine-powered helicopters capable of lifting more people and heavier loads. Although surplus military helicopters were available for public use (police and fire departments), manufacturers were geared to manufacture newer, more specialized 'copters for civilian entrepreneurs. Since the pilots and their equipment were already available, what was needed was something to bring them together. Again, a spin-off from the Vietnam War would provide the catalyst.

Young doctors enured in the MASH units of Korea and Vietnam had learned that when critically injured people were stabilized (bleeding stopped, shock averted, heartrate and blood pressure maintained, etc.) within the first hour after their trauma, their survival rate dramatically improved. This is why aid stations and surgery units were placed as close as possible to the front lines. Doctors treated wounded soldiers on the basis of a pre-operative triage (separating patients according to the seriousness of their condition) and stabilized them before they were sent to hospital ships, Japan, or stateside for further, more extensive treatment. When the interval between the wounding and the treatment was reduced by using helicopters to evacuate patients quickly, survival rates soared. Massive trauma that was certain death in World War II was being treated successfully in Korea and later Vietnam.

When these "Hawkeye Pierces" and "Trapper John McIntires" returned to civilian practice, they put this knowledge to good use. They convinced hospital administrators to create highly specialized emergency rooms called "shock-trauma units." These trauma centers, staffed by the most highly qualified doctors and nurses specializing in emergency medicine and supplied with state-of-the-art equipment, were all but useless unless patients could get to them within that first "golden hour" after injury. So, the next logical addition to the trauma center's staff and equipment were a pilot and a helicopter.

Accident and Regulatory History

The early 1980's saw the real burgeoning of EMS using helicopters, but the mid-1980's brought a surprising and alarming jump in fatal accidents in EMS helicopter operations. In 1984 there were three accidents with two fatalities, but in the following year, 1985, there were 11 accidents with 12 fatali-

ties. Then, 1986 was even worse—4 accidents and 13 fatalities.

Although EMS hours flown were not calculated as with other aircraft operations, i.e., 100,000 hours flown, the NTSB in a 1988 safety study on commercial EMS helicopter operations was able to extrapolate some distressing figures. From 1980 through 1985, commercial EMS helicopter operations had an estimated accident rate of slightly more than 12 accidents per 100,000 hours flown. This rate was twice that of nonscheduled FAR Part 135 helicopter operations and one and one-half times that of all turbine-powered helicopters. The fatal accident rate for EMS helicopters was 5.4 per 100,000 hours flown—three and one-half times greater than the fatal accident rate for nonscheduled FAR Part 135 helicopter air taxis. This situation was surprising because the people involved were so professional and the record had started out so promising; alarming because the very people these operations were trying to save were becoming the fatalities.

FAA and the helicopter industry immediately began examining the problem and looking for solutions. No one really wanted to go for the easiest one: Have the FAA put a halt to EMS operations—a solution that was really a non-solution given the potential for saving lives. What everyone wanted was to isolate the causes of these accidents and use that to prevent future ones from occurring, all without compromising regulations, patient safety, or the business' ability to compete in the marketplace.

Accident Analysis

As a result of accident analyses conducted by FAA and NTSB and of studies conducted by a national EMS task force (consisting of EMS pilots, flight nurses, paramedics, and industry representatives from the National EMS Pilots Association (NEMSPA) and the Helicopter Association International), a number of causal factors came to light, some of which were not really unique to EMS helicopter operations. That is, they were causal factors that could affect any aircraft operation—weather, mechanical failure, lack of pilot experience. However, one area that seemed unique to EMS operations was *pilot fatigue brought on by long duty hours*. During a study of 166 commercial aeromedical operators in 1987, FAA had discovered that the typical shift for an EMS pilot was 24 hours, but some operators used a 48-hour or 72-hour shift on the high end as well as the low end of 12 hours. Of course, the pilot did not fly for 24 hours or 48 hours straight, but he or she would be "on call" for that entire time, perhaps with sleep patterns disrupted or interrupted or with no opportunity to obtain meaningful rest.

Rest Requirements

FAR § 135.271 sets rest and flight time requirements for HEMES (Helicopter-based Emergency Medical Evacuation Services). Basically, no flight crewmember can accrue more than eight hours of flight time during any 24 consecutive hours of a HEMES assignment. Any flight crewmember who exceeds this eight hours must be relieved of duty until he or she obtains 12 consecutive hours of rest for a 48-hour HEMES shift or 16 consecutive hours of rest for a shift more than 48 hours. A flight crew-member must also receive eight consecutive hours of rest during a 24-hour period of a shift. If the flight crewmember does not obtain eight consecutive hours of rest, he or she must be relieved of duty. Also, during each calendar year, an operator must assure that flight crewmembers receive 13 rest periods of at least 24 consecutive hours.

Human Factors

FAA also believed that emotional stress may have played an important part. The old adage of "fly the airplane first" may be difficult to keep in perspective when the pilot realizes that the patient he or she is carrying may be a child the same age as his or her own or a person similar to a spouse or parent. The overwhelming urge is to get that person to help as fast as possible, and the memory of combat missions ("Get it done at all costs regardless of the risks—you're saving a life.") may also induce a sense of exigency that is not appropriate to typical civilian rescue missions.

Another factor was that often the helicopter crew was dealing with emergency personnel at the site of accident who may have a distorted image of the capabilities of a helicopter. The landing area set aside may have obstructions that would place the helicopter and its "cargo" at undue risk or the surface may not support a landing. Also, when the call comes for a medevac mission, there is little time for checking weather or flight planning, and the crew may literally have to "wing it" and in some cases fly into an unfamiliar area. Add non-IFR equipped aircraft, maybe non-instrument rated pilots, nighttime, and quite possibly the weather conditions that caused a ground accident in the first place, and the scene would be set for disaster.

Another often-discussed but unproven factor may have been simple business competition. The services these companies supplied had to be competitive—who can get the patient there the fastest. On-scene rescue crews would sometimes call a second operator after the first one had refused the mission for safety reasons, and the second operator would jump at the chance to take business away from a competitor. In addition, the hospitals that contract with FAR Part 135 operators for air ambulance services may have placed stress on pilots by emphasizing the need to take every call and not heed the weather, the helicopter's condition, or their own fatigue. In many cases, hospital admin-

EMS ACCIDENT OVERVIEW

From 1978 to 1991 there were
80 EMS accidents:

- **40** were fatal accidents
- **76** involved helicopters
- **4** involved fixed wing aircraft
- **42** occurred at night
- **52** were classified as caused by pilot error
- **22** were classified as caused by mechanical failure
- **22** were classified as caused by weather
- **12** involved striking objects

Of the 76 helicopter accidents only **22** were considered "on scene;" **45** were inter-hospital transfers.

istrators responsible for EMS operators had no aviation background and could not understand the safety reasoning behind an operator's refusal to provide a service the hospital had paid good money for. After all, if this company could not do it, there were dozens of others in a locality that could.

The Industry's Response

The industry EMS task force came to about the same conclusion as the FAA and the NTSB about what needed changing in EMS operations: appropriate equipment (IFR capable helicopters and instrument rated and current pilots), staffing schedules (limits on duty times), training for pilots, and government regulation of this aspect of the industry. Working with insurance carriers many operators responded without impetus from the FAA: They hired and trained more pilots so that shifts could be shorter; they established training programs that emphasized both initial and recurrent training especially in the areas of night flight and all-weather flight; they established minimum operating conditions that in some cases were more restrictive that those required by FAR Part 135, and they required their pilots to adhere to them; they established procedures that kept pilots from knowing who they were flying or what condition they were in; they contacted police and fire departments to offer training on the types of situations helicopters could not handle; they worked with hospital administrators to re-think business philosophies and emphasized that the safety margin was just as important as the profit margin; and they made their helicopters IFR capable. The rest—establishing and enforcing operating standards—as always was up to the FAA.

FAA's Role

Like any air taxi operator carrying passengers for a fee, EMS helicopter operators must have FAA certification under FAR Part 135. FAR Part 135 has extensive requirements for management personnel, training, operating procedures and conditions, and so on. Certificated EMS helicopter operators must adhere to all appropriate aspects of FAR Part 135. (Public-use aircraft operated by police and fire departments do not have to have a FAR Part 135 certificate and may not have to adhere to all of the FAR that apply to air taxi operators.) Once certificated, EMS helicopter operators are subject to FAA inspection and surveillance of their personnel, equipment and facilities to ensure compliance with the regulations.

Yet, EMS helicopter operators are a unique facet of FAR Part 135 commercial operators. An EMS operator may be only one part of a larger FAR Part 135 operator whose main business is the carriage of passengers not in need of medical assistance; that is, the EMS operation is only a minor part of the overall business. Or, EMS operations may be the only business that the FAR Part 135 operator conducts. FAA has had to respond to each of these situations so that a level of safety can be maintained without burdening either type of operator. Indeed, after the increase in accidents in the mid-1980's, there were calls for heavy-handed FAA response; e.g., to require that only twin-engine helicopters be used, to require two-pilot crews, or to require all operations to be conducted under IFR. These actions may or may not have improved the accident record, but the industry and FAA knew that such drastic measures would put most EMS operators out of business.

FAA's approach was to explain that the existing standards in FAR Part 135 were sufficient, but what was needed was education on how to apply them appropriately to EMS operations. For example, the training program required by FAR § 135.341 would have to be "customized" to EMS operations. The FAR Part 135 operator for whom EMS was only a "sideline" of the overall operation would have to consider pulling the EMS pilots out of the regular training program and/or supplementing it with material directed at EMS flights. The EMS operator who flew nothing but EMS missions would have to design its entire training program around EMS considerations. FAA principle inspectors for such operators would have to be very aware of the operators' unique operating situations.

FAA and Industry Standards

The EMS industry, through its several professional organizations, not only demonstrated a strong commitment to self-improvement of its safety record but also recognized that it had to work with the FAA in improving and maintaining a clean record and a good reputation. While the EMS industry was working on its internal improvements (see above), FAA was keeping up its end. In 1988 FAA published Advisory Circular (AC) 135-14, "Emergency Medical Services/Helicopters." This AC outlined some crucial definitions concerning EMS operators as well as explained certification requirements, training programs, and operational requirements. It described a suggested safety program and provided a sample of flight and duty time records, a sample of operations specifications, and a sample weight and balance loading schedule. The AC also suggested types of additional equipment, detailed manual requirements and flight following/dispatch procedures,

and offered suggested VFR weather minimums for dispatch as well as types and numbers of personnel. The EMS industry had aided FAA in drafting the AC and were generally pleased with the information and advice it offered. In 1989 FAA updated the AC, adding definitions of the two types of air ambulance services offered—Basic and Advanced—among other additions. (In December 1990 FAA also issued AC 135-15, "Emergency Medical Services/Airplanes," which followed a similar format for airplane air ambulance services. Airplane EMS operations have grown in their own way, advancing from DC-3's and King Airs to corporate jets. Airplane EMS operations are also moving into the international arena.)

FAA worked closely with EMS industry representatives in the development of the AC's and in the development of the next logical regulatory step to enhance air ambulance safety: Air ambulance operations specifications. FAA issues every FAR Part 135 operator a set of *operations specifications* which outline in detail the kinds of operations that can be conducted and the conditions under which they can be conducted. No FAR Part 135 operator can legally operate outside these "ops specs;" discovery could mean legal enforcement action from the FAA and possibly loss of certification. In 1992 FAA developed the first set of EMS specific ops specs. By sometime in 1993 in order to conduct EMS operations, a FAR Part 135 operator will have to have an "air ambulance paragraph" in its ops specs; otherwise, the operator cannot hold out to the public as a provider of air ambulance services. This will not only help FAA to identify EMS operators more accurately for surveillance and tracking purposes, it will also help to reduce the likelihood of unscrupulous FAR Part 135 operators taking an EMS flight they may not be trained or equipped to handle. No one—the public, the FAA, or the EMS industry—wants to encounter an operator who pulls seats out in order to shove an unsecured gurney inside.

The cooperation between the FAA and the EMS industry in the regulation of and policy development for air ambulance services using helicopters is one of the better examples of an ever-growing safety partnership, a continuing partnership that is now working on enhanced safety and training programs for EMS operators. For its part, FAA will continue to strive in partnership with the EMs industry to structure future rules and policies that will maintain public safety and enhance economic growth. The FAA is also encouraging EMS operators to participate in its *voluntary disclosure* or "self-audit" program, which allows operators to identify potential or existing problems and work with the FAA to correct them without fear of legal enforcement action.

EMS Lessons for All Pilots

The helicopter EMS aspect of the aviation industry has experienced the highs and lows that any innovation has to endure in order to prove itself. The advantages of the use of helicopter in medical transport—emergency or routine—far outweigh the prospect of having to do without them in such a service. Through its preponderance in HEMES operations, the helicopter has once again been vindicated as an integral part of civil aviation.

The reaction of the EMS industry to its mid-1980's accident rate and an aberrant spike in the number of accidents in the early 1990's (solvable, FAA and industry believes, with the enhanced training programs now being devised) is an example of how everyone in aviation needs to react to safety crises: Safety issues will not go away by being ignored; they have to be addressed proactively by the FAA and the industry in partnership.

The predominant causes of EMS accidents can give any pilot in any operation some food for thought:

- Don't fly when you are tired; get plenty of rest *before* entering the cockpit.
- Don't fly when you are stressed; leave daily stresses behind before flying for work or pleasure.
- Don't succumb to "corporate pressure" or "get-home-itis" and fly when your better judgement says not to.
- Know and follow the regulatory weather minimums and abide by them or establish your own, stricter minimums.
- Maintain your instrument currency and proficiency if you are instrument rated.
- Get an instrument rating if you don't have one.
- Above all, fly the aircraft first and foremost; don't let distraction take over the controls.

We all do our best to avoid accidents of any kind, but if a catastrophe avoidably occurs, the beat of the rotor blades during that "golden hour" is something we all want to hear. ■

To obtain copies of AC 135–14A or 135–15, contact DOT, M–443.2, Washington, DC 20590. A copy of the NTSB safety study NTSB/SS–88/01, "Commercial Emergency Medical Service Helicopter Operations," is available from the National Technical Information Service,Springfield, VA 22161. Special thanks go to FAA's Air Taxi and Commuter Branch, to FAA Aviation Safety Inspector Edwin Robinson, and to the Helicopter Association International for their assistance in the preparation of this article. Photos courtesy of Bell Helicopter Textron, Inc.

The word has been out on airspace reclassification just long enough for the questions to start coming in. The way we would like to handle them is in a regular "Airspace Corner" column, similiar to our "Instrument Corner." For future editions of "Airspace Corner" we would welcome questions, comments, or subjects that the readers feel need clarification. ***—Editor***

The first of the new visual charts (Sectional and Terminal) appeared October 15th. By the time you read this, the December charts will be out, and we will be halfway through the first cycle. We have received several calls regarding the charted vertical limits of control zones at non-TCA/ARSA airports with operating control towers, and we would like to share those questions and their answers with you—you may have had the very same thoughts!

Question: *Was the airport traffic area (ATA) lowered to the same height of the control zone?*

Answer: No! Only the control zones were changed via rulemaking that was effective October 15th. The ATA's lateral limits continue to be a five-statute mile radius of the airport, and its vertical limits extend up to, but do not include, 3,000 feet AGL. The ATA's will be eliminated effective September 16, 1993, at which time the charted control zones become Class D airspace. Remember that the radius of the ATA probably does not coincide with the charted control zone boundary boundary and, in almost all cases, the 2,999 foot AGL limit will be higher than the control zone's upper limit. Based on the calls received to date, FAA's Air Traffic Service has updated the NOTAM on November 12th to further clarify this point.

Question: *At Sacramento Executive, the chart indicates the vertical limit of 2,500 feet MSL for the control zone and the Mather AFB ARSA is 1,600 feet MSL. Which altitude applies?*

Answer: For that portion of the control zone that underlies the ARSA, the vertical limit is up to, but does not include 1,600 feet MSL. The 2,500 foot MSL limit applies to that airspace outside the ARSA. Under the reclassification program, there is a hierarchy within the classes that prevents overlapping. In this case, the Mather ARSA (Class C) preempts the Executive control zone (Class D).

• Night Flight

The question of when can a pilot log night time has come up several times recently. The U.S. Federal Aviation Regulations (FAR) Part 1 and the Airman's Information Manual (AIM) glossary defines "night" time as "the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time." Some pilots use FAR § 61.57(d) to define when they log night time. This paragraph states in part, "No person may act as pilot in command of an aircraft carrying passengers during the period beginning one hour after sunset and ending one hour before sunrise (as published in the American Air Almanac) unless, within the preceding 90 days, he has made at least three takeoffs and three landings to a full stop during that period in the category and class of aircraft to be used."

Which do I use?

Why is there a disparity?

I fly in Europe. Evening civil twilight here is defined as official sunset plus 30 minutes, and morning civil twilight is defined as official sunrise minus 30 minutes. Believe me, it is dark then.

Please, clarify when I can log night time.

Gregory J. Findlay
APO AE

First, if you are flying in Europe on the basis of your American pilot certificate in a U.S. registered civil aircraft, you must comply with FAR Part 91 Subpart H. Subpart H, Foreign Aircraft Operations and Operations of U.S. Registered Civil Aircraft Outside of the United States, states in part in FAR § 91.703 (a), "Each person operating a civil aircraft of U.S. registry outside of the United States shall- (1) Note: Part 1 deals with flight over the high seas and is not applicable here. (2) When within a foreign country, comply with the regulations relating to the flight and maneuver of aircraft there in force; (3) Except for §§ 91.307(b), 91.309, 91.323, and 91.711, comply with this part so far as it is not inconsistent with applicable regulations of the foreign country where the aircraft is operated or annex 2 of the Convention on International Civil Aviation." Based upon FAR § 91.703(a)(2) and (3) you must compare your host country's rules regarding night flying with the U.S. rules and apply the above guidance.

To answer your question about night time in the United States, FAR Part 1 defines official "night" so pilots can log the conditions of flight, day or night, required by FAR § 61.51(b)(3)(i). FAR § 61.57(d) defines a pilot proficiency requirement that must be complied with before the pilot can be pilot in command (PIC) of an aircraft carrying passengers during the period stated in the rule. The more restrictive pilot proficiency "night" definition is designed to ensure a greater degree of darkness. Pilots using the proficiency requirement of FAR § 61.57(d) to define "night" time for logging night time required by FAR § 61.51(b)(3)(i) may be cheating themselves out of night time required for meeting certain certificate requirements.

• Diving and Flying

I read with interest your brief article in the March-April issue regarding scuba diving and flying. Many divers operate under the misguided assumption that a pressurized plane has a cabin pressure of sea level and, further, do not consider the potential for a complete depressurization at 30-40,000 feet and the probable complications just after diving.

While diving in Florida and since, I made 15-20 dive trips to the Bahamas and the Florida Keys in non-pressurized, mostly single engine airplanes. Many of the trips were one day trips with two tank dives each trip. My friends and I used the "Tahoe Tables" in reverse to calculate a safety zone depth for our dives. That is, we calculated how deep we could dive based on the altitude correction in the Tahoe Table. The altitude used was the altitude we intended to use flying back to the states. We never had a problem, but I always wondered whether this was luck or whether the Tahoe Tables really worked for these types of situations. Can you folks validate this procedure as a practical approach?

Ken Brown
Humble, TX

Sorry. The FAA cannot validate your procedure. Although the *Airman's Information Manual* was changed to reflect the latest available information concerning scuba diving and flying, the specific approval you are asking for should be requested from diving experts familiar with high altitude diving. Possibly one of the diving certification associations, the Divers Alert Network (DAN), or a diving safety/medical journal article on the subject might be able to answer your question

FAA AVIATION NEWS welcomes comments from its readers. We may edit letters for style and/or length. We will select one representative letter from those on the same topic for publication, and, because of our bimonthly publishing schedule, responses may not appear for several issues. We will send personal replies only upon request. We will not print anonymous letters, but we will withhold names upon request. Address: Editor, FAA AVIATION NEWS, AFS–810, Washington, DC 20591.

Flight**FORUM**

• Logging PIC Time

Here we go again. I need clarification on the logging of PIC time. Can a non-instrument rated pilot log PIC time on an IFR flight plan, either IMC or VMC, with a current and qualified instrument pilot (not a CFII) in the right seat?

D. Chris Anderson
Columbia, SC

Yes, under the following conditions. First we must differentiate between the two meanings for PIC. One meaning for PIC is the FAR Part 1 definition of "the pilot responsible for the operation and safety of an aircraft during flight time." You can not be PIC on an IFR flight plan without being an instrument-rated pilot and holding the appropriate pilot and aircraft ratings. But you can log PIC time under the second definition of PIC which FAR § 61.51(c)(2)(i) defines in part as that time when the pilot is the sole manipulator of the controls of an aircraft for which the pilot is rated. FAR § 61.51(c)(4) then defines instrument time as being that time during which a pilot operates an aircraft solely be reference to instruments, under actual or simulated instrument flight conditions. As a result of the two definitions, you cannot be PIC (responsible for the flight), but you can log as PIC time that time during which you are the sole manipulator of the controls of the aircraft for which you are rated. This PIC time (sole manipulator) is creditable towards the minimum time needed to meet the flight experience requirements for an instrument rating under FAR § 61.65, Instrument Rating Requirements.

• VFR Restricted

I recently obtained my Airplane Single Engine Land rating from the local FAA in Frankfurt, Germany, via my military experience. This rating was an add-on to my multi-engine/instrument. When I obtained this addition it came limited to VFR only. I know this would be correct for a multi addition. My question is: Is the VFR restriction correct for the addition of single engine land?

Emmett Tullia II
Manchaca, TX

If the circumstances are as indicated in your letter, then the VFR limitation should not have been issued, but check with FAA's Frankfort office to be sure. Usually a person who has a multi-engine rating with instrument privileges may, when issued an airplane single rating, exercise instrument privileges in that single engine airplane without further showing of competence.

Answers to Quiz: 1-E, 2-I, 3-C, 4-J, 5-B, 6-G, 7-A, 8-F, 9-L, 10-D, 11-H, 12-K

• VFR on Top

There seems to be a misunderstanding between pilots and FAA air traffic controllers as to altitude requirements while flying VFR-on-top. The pilot/controller glossary in the Airman's Information Manual (AIM) *and the* Air Traffic Control Handbook *both state under "VFR-on-top" that a pilot must comply with the minimum IFR altitudes specified in FAR Part 91. Pilots are being advised in a popular, widely read aviation magazine that VFR-on-top (*Flying *magazine, October 1991, "Eyeball Separation" by J. Mac McClellan) allows pilots to descend below the minimum en route altitude (MEA). Controllers do not allow a VFR-on top aircraft to fly below MEA's or minimum IFR altitudes (MIA), yet many pilots expect to be able to do this. Who is correct?*

Mikhail H. John
Salt Lake City, UT

The FAR and controllers are correct. What may have confused some pilots is that there may be more than one FAA-approved IFR minimum altitude for a given route segment. Some minimum altitudes are published on charts. Others are only published for controller use. As a result, although IFR pilots operating on an IFR clearance must comply with FAR §§ 91.177, Minimum altitudes for IFR Operations, and 91.179, IFR Cruising Altitude or Flight Level, they may be able to request a lower "minimum" altitude than the published or derived MEA depending upon the route segment being flown and the type of navigation equipment being used.

Since VFR-on-top is an IFR clearance, the pilot requesting it must comply with the various IFR altitude rules in the FAR. For VFR pilots not familiar with the term, the AIM defines VFR-on-top as an "ATC authorization for an IFR aircraft to operate in VFR conditions at any appropriate VFR altitude (as specified in FAR and as restricted by ATC). A

pilot receiving this authorization must comply with the VFR visibility, distance from cloud criteria, and the minimum IFR altitudes specified in FAR 91. The use of this term does not relieve controllers of their responsibility to separate aircraft in TCA's/TRSA's." As you can see, ATC may be able to authorize a lower-than-chart-published minimum en route altitude and still comply with the FAR.

To answer your question, *FAA Aviation News* contacted Mr. McClellan about his article. He said many people wrote him about his comments. Please see, "FlyingMail" in the December 1991 issue of *Flying* magazine for some of the comments. In his response to his readers, he clarified the difference between a "direct" clearance and flying between VOR's on an airway and how the difference between the two types of clearances determine the minimum en route altitude ATC can approve for a given route segment. As he said in his article, it may be possible to request a lower-than-published IFR en route altitude, and if one is available, and ATC authorizes the use of that altitude, the pilot can fly it.

Please remember the purpose of the FAR altitude rules are to protect pilots by providing them the minimum safe flight altitudes or means of determining minimum safe altitudes based upon terrain, known obstacles, and navigational requirements for the route segment being flown. What apparently confused some pilots about the *Flying* magazine article is that they did not know or remember that there may be several different IFR altitudes available to controllers and pilots for a given route segment depending upon what type of navigational equipment is being used for course guidance, i.e. VOR, radar, or RNAV. Aircraft distance from a fix or radar site may also be a factor in determining the minimum altitude available for a given route segment.

As a reminder to IFR pilots, examples of *some* of the different minimum IFR altitudes defined in the AIM include *minimum vectoring altitudes* (MVA) which are altitudes that can be used by radar controllers in certain circumstances depending upon the strength of the radar return. MVA's may be lower than a published MEA along an airway or J-route segment. *Minimum obstruction clearance altitudes* (MOCA) which provide obstacle clearance over the entire route but only ensurés acceptable navigational signal coverage only within 25 statute (22 nautical) miles of a VOR. MOCA's may also be lower than MEA's. And then there is the *minimum en route altitude* (MEA), which most IFR pilots use in flight planning, that provides both obstacle clearance and navigational guidance between radio fixes. On unpublished direct routes the *minimum IFR altitude* (MIA) established by the ATC facility and the MIA for the pilot complying with the FAR may not be the same. Whenever the pilot is lower, action in the form of a clearance or restriction will be taken by the controller to ensure the operation is conducted at or above the facility sector MIA.

These and other minimum and maximum IFR altitudes are defined in the AIM. IFR pilots should review the AIM periodically as a reminder of the specific types of IFR altitudes available in the National Air Space (NAS) system, and by understanding them, IFR pilots may in fact be able to request a lower minimum altitude than the chart published MEA for a given route segment.

Turn Coordinators in Aerobatic Aircraft

An investigation into an aerobatic aircraft fatal accident has highlighted the fact that turn co-ordinators can give ambiguous indications during an inverted spin. A causal factor in the accident was the pilot's failure to recover from an inverted spin. It is probable that the pilot failed to identify correctly the spin mode and direction and hence failed to take the correct spin recovery action.

The aircraft was fitted with a modern turn co-ordinator. This instrument, unlike a conventional turn and slip indicator, does not have a turn needle. A turn co-ordinator measures both roll and yaw rates and will only give reliable indications of yaw direction in an erect spin. In an inverted spin, since the aircraft yaws in one direction and rolls in the other, a turn co-ordinator may give an incorrect indication of yaw direction to the pilot. A conventional turn (needle) indicator measures yaw rate only and therefore always indicates the correct yaw direction in both erect and inverted spins. If a pilot is disorientated in a spin, whether erect or inverted, reference to a turn needle will correctly confirm the spin direction and should insure that the correct recovery action is taken.

The provision of a turn indicator (i.e., turn needle) is strongly recommended for aircraft cleared for spinning and aerobatics in order to identify correctly the direction of spin in both erect and inverted spin modes.

Editor's Note: This article is reprinted with permission from the September 1992 British CAA General Aviation Safety Information Leaflet *(GASIL).*

Awards for the CFI and the AMT of the Year

"I have the world's smallest aerobatic school—one airplane, one sick sack, and an instructor (himself). Then last week a guy used the sick sack, and now I am in serious financial trouble," said the 1992 Certificated Flight Instructor (CFI) of the Year. The comments were made during ceremonies at FAA headquarters in Washington, DC on November 16 honoring the winners of the 1992 CFI and Maintenance Technician of the Year awards. Although everyone laughed at the joke made by the owner/instructor of the "world's smallest aerobatic school," no one questioned his selection as the General Aviation Industry Awards Program's Certificated Flight Instructor of the Year for 1992. After all, Mr. William K. Kershner of Sewanee, TN, has taught students and pilots a thing or two about flying over the years. The 1992 Maintenance Technician of the Year, Mr. John Canedo of Herndon, VA, has an equally impressive record of accomplishments in General Aviation. Mr. Canedo is responsible for supervising the maintenance on six multi-million dollar jet aircraft for a major corporation. Both winners were recognized by the General Aviation Industry Awards Program for their life-long contributions to the industry.

FAA Administrator Richards (left) with CFI of the Year William Kershner (center) and AMT of the Year John Canedo.

Mr. Kershner is the well-known author of many flight training handbooks on aviation. His flying career dates back to 1945 when he first started flying in his hometown of Clarksville, TN. Since then, he has served as a Navy pilot during the Korean War and as the Experimental Flight Testing supervisor for Piper Aircraft. Since 1964 he has taught aerobatics in Sewanee, TN while writing the flight training manuals that have made him famous. In addition to his writing and flight instructing, he promotes aviation safety as a speaker at many aviation events and seminars.

Mr. Canedo's aviation career also started in the 1940's when he built and flew model aircraft. A commercial pilot, Mr. Canedo decided maintaining aircraft satisfied his mechanical appetites more than flying them. While pursuing his career in general aviation maintenance, he worked for several fixed-based operators (FBO) over the years before joining the Gannett Company in 1986. At Gannett, he supervises eight A&P maintenance technicians who maintain a fleet of six jet aircraft. His dedication and interest in aviation maintenance have resulted in many of his aircraft modification ideas being incorporated in the work of his company and its aircraft manufacturer and other manufacturers.

Both men recognized the help and support provided by their families and colleagues over the years that contributed to their being selected for their respective honors. During the ceremony, in addition to receiving plaques from FAA Administrator Thomas C. Richards, the winners also received awards and gifts from many general aviation companies, associations, and industry groups. During their visit to Washington, the honorees and their families met privately with Secretary of Transportation Andrew H. Card, Jr. and the FAA Administrator as part of their industry-sponsored tour of Washington. This year's General Aviation Industry Awards Program was sponsored by the AOPA Air Safety Foundation, the General Aviation Manufactures Association, the National Business Aircraft Association, and the Federal Aviation Administration.

Cellular Phones

The latest Federal Communcations Commission (FCC) ruling on cellular phones does allow them to be used on an aircraft as long as it is still on the ground. Once the aircraft (this includes hot air balloons) leaves the ground, usage is prohibited, and violators are subject to a fine.

Accident Prevention Program Seminars

You have seen the commercials after the Super Bowl where the off-camera announcer says to the Most Valuable Player, "You've just won the Super Bowl! Where are you headed now?" The response is, "I'm going to Disney World!" So what does this have to do with flying? Now that we are in the depths of winter, many of us yearn for the sunshine and sandy beaches of Florida, but if we have young children, we end up at Disney World. If you load the spouse and kids into the family airplane and head for the "Mouse House," you (the pilot in the family) might want a little diversion. Why not continue your Accident Prevention Program education while you are in central Florida? Mr. Obie Young, Accident Prevention Program Manager in the Orlando, FL Flight Standards District Office, offers the following meetings in the upcoming months. If you need more detailed information, contact Mr. Young at (407) 648-6840.

GENERAL AVIATION SAFETY SEMINARS

TUESDAY, JANUARY 12, 1993 7:30 P.M.
On Landings Part II
Tampa General Hospital, Tampa, FL

WEDNESDAY, JANUARY 13, 1993 7:30 P.M.
On Landings Part II
MSL Auditorium, St. Petersburg, FL

SATURDAY, JANUARY 16, 1993 9:00 A.M.
Ultralight Seminar
Lakeland, FL

THURSDAY, FEBRUARY 4, 1993 7:00 P.M.
Navaids
Savage Aviation, Sandford, FL

THURSDAY, MARCH 4, 1993 7:00 P.M.
Instrument Flight
Savage Aviation, Sanford, FL

SATURDAY, FEBRUARY 6, 1993 ALL DAY
General Aviation Pilots Association
Sanford, FL

SUNDAY, FEBRUARY 7, 1993 ALL DAY
General Aviation Pilots Association
River Ranch Resort, FL

TUESDAY, FEBRUARY 9, 1993 7:30 P.M.
On Landings Part III
Tampa General Hospital, Tampa, FL

WEDNESDAY, FEBRUARY 10, 1993 7:30 P.M.
On Landings Part III
MSL Auditorium, St. Petersburg, FL

WEDNESDAY, MARCH 3, 1993 6:30 P.M.
WEDNESDAY, MARCH 10, 1993 6:30 P.M.
WEDNESDAY, MARCH 17, 1993 6:30 P.M.
WEDNESDAY, MARCH 24, 1993 6:30 P.M.
WEDNESDAY, MARCH 31, 1993 6:30 P.M.
Airspace Reclassification*
Daytona Beach, FL

TUESDAY, MARCH 9, 1993 7:30 P.M.
Enforcement
Tampa General Hospital, Tampa, FL

WEDNESDAY, MARCH 10, 1993 7:30P.M.
Enforcement
MSL Auditorium, St. Petersburg, FL

SATURDAY, MARCH 20, 1993 8:00 A.M.
Wings Weekend
Orlando, Jacksonville, St. Petersburg, Melbourne, Punta Gorda, Flagler County, Fort Pierce, Sanford, Lakeland, and Crystal River

THURSDAY, APRIL 1, 1993 7:00 P.M.
Preflight
Savage Aviation, Sanford, FL

ALL WEEK, APRIL 18–24, 1993
Sun 'n Fun
Lakeland, FL

THURSDAY, MAY 6, 1993 7:00 P.M.
Ground Operations
Savage Aviation, Sanford, FL

THURSDAY, JUNE 3, 1993 7:00 P.M.
Communications/Manuevers
Savage Aviation, Sanford, FL

THURSDAY, JULY 1, 1993 7:00 P.M.
Weather and Airspace
Savage Aviation, Sanford FL

SATURDAY, AUGUST 14, 1993 9:00 A.M.
Corporate Aviation Seminar
Lakeland, FL

*Day two of a three-day Operation Raincheck

WARNING—Autogas and Alcohol Don't Mix

We all know that drinking and flying are a no-win combination, but did you know that users of autogas could have a problem with automobile gasoline that has been blended with "oxygenates"—i.e., alcohol?

FAA inspectors in North Carolina learned that there was plenty of *unlabeled* blended automobile gasoline containing oxygenates available. Because these blends are unlabeled, the autogas user may unknowingly purchase what he or she believes to be regular autogas. Use of such blended autogas in an aircraft can create a potential safety problem, and Mr. John Colomy, Manager of FAA's Standards Office in the Central Region, wants us to "get the word out" about this likely hazard.

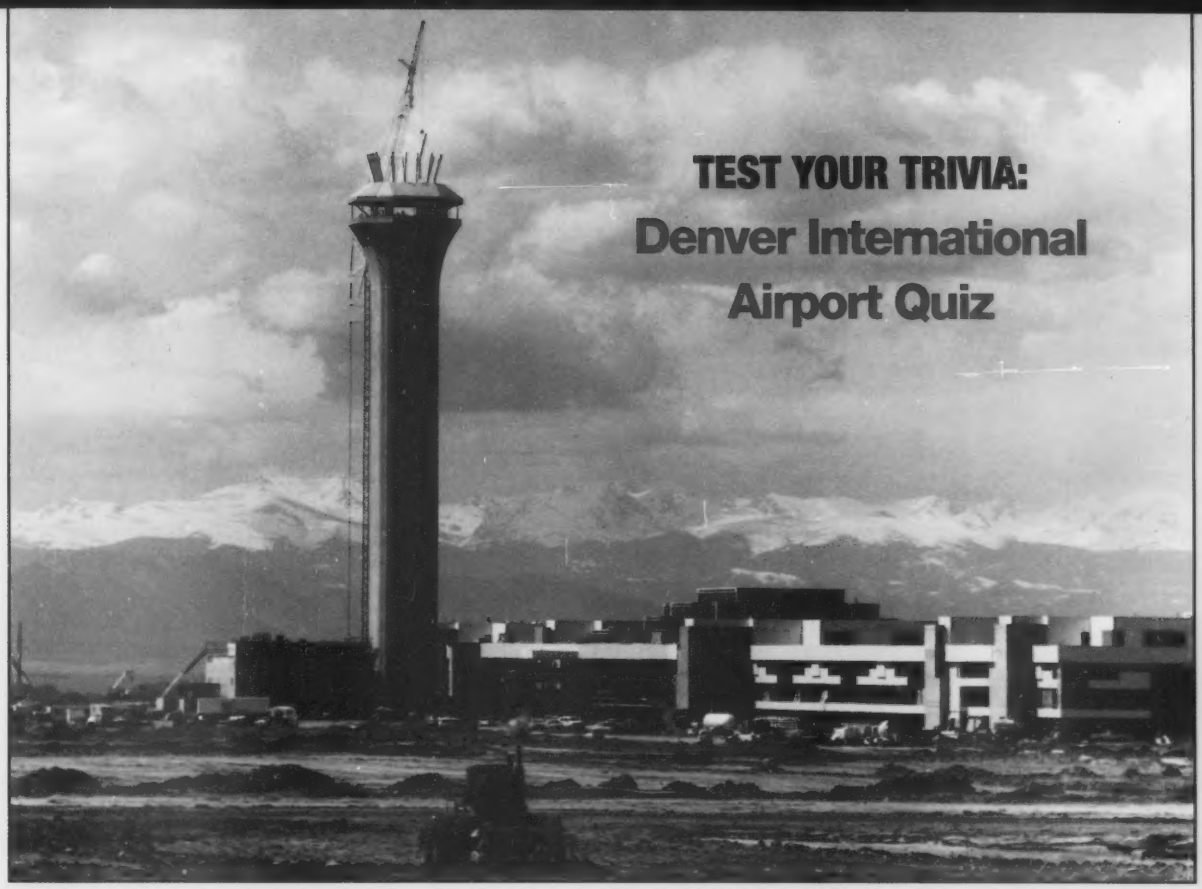
Both the Experimental Aircraft Association (EAA) and Peterson Aviation, the main holders of the autogas Supplemental Type Certificates (STC), prohibit the use of autogas blended with alcohol, and both STC holders state this prohibition on the placards installed next to the airplane's fuel filler caps. Both also sell kits to test autogas for the presence of alcohol. Neither STC holder addresses the use of autogas blended with ether. The FAA's position at this time, is that methyl-tertiary-butyl ether (MTBE) and other oxygenates are not approved because no STC testing has been done. (To date, research conducted with autogas blended with MTBE have not uncovered any serious problems with this additive, and in the future the FAA may be in a position to approve the use of autogas blended with MTBE once STC testing has been addressed. If MTBE additives are approved without the need for hardware changes to airplanes, the STC holders may not have to revise their STC's.)

Tests conducted with autogas blended with alcohol (ethanol and methanol) have shown problems with corrosion of metal parts and deterioration of non-metallic seals and hoses. It is unlikely that FAA can approve alcohol blends without requiring hardware changes to the airplane's engine and fuel system. Consequently, FAA approval of STC's for alcohol blends is not in the foreseeable future.

At this time, the problem of unlabeled blended autogas does not require rescission of the autogas STC's. FAA's Office of Environment and Energy is working with the U.S. Environmental Protection Agency concerning the labeling of fuels blended with oxygenates. In the meantime, airplanes owners who use autogas under the STC's should purchase autogas from sources they know have been tested for alcohol or from sources that can document that oxygenates are not in the fuel. Autogas users can also test the fuel themselves using the available test kits.

FAA cautions against using autogas containing oxygenates until such time as they are approved for use in aircraft. The aircraft operator has the responsibility to determine if the fuel used meets the requirements of the STC. If the approved autogas is not available, there is always aviation grade gasoline.

Any autogas users with questions about blended autogas should contact EAA or Peterson Aviation.



TEST YOUR TRIVIA: Denver International Airport Quiz

After reading the article on page 17, match the correct answer to the questions. *(Information provided by the Denver International Airport Public Affairs)* *(For the answer key see page 26.)*

1. What is the surface area of the new airport? ___
2. What is the concrete surface area of the first design phase of construction (six runways, ramps, and taxiways)? ___
3. How many dump truck loads of earth will be moved during construction? ___
4. If the earth in question 3 was put in a pile how large would the pile be? ___
5. The total earth being moved is equal to about half of the volume of what famous earthmoving project? ___
6. What is the total raw material, asphalt and cement, needed to build the first phase? ___
7. During the first phase of construction 36 million cubic yards of earth will be moved. This volume would fill a ditch 10 feet by 10 feet from Denver to what famous city? ___
8. How many square miles of airspace are involved in the Victor Airways changes being made to serve the Denver region? ___
9. How many square miles of airspace are involved in all of the jet airways, SID's, and STAR's being changed to serve the area? ___
10. What is the number of new or amended airway segments involved in the change? ___
11. What is the number of new approaches, STAR's, SID's, and departure procedures involved in the change? ___
12. What is the number of new or canceled intersections being made to support the new airport? ___

ANSWERS

A. New York City

B. The Panama Canal project.

C. Enough loads that if the trucks were placed end to end the line would reach 1.5 times around the world. The amount is about 100 million cubic yards of dirt.

D. 163

E. 53 square miles or twice the size of Manhattan Island in New York.

F. 25,000 square miles

G. In excess of 10 million tons or enough, for you football fans, to fill Mile High Stadium in Denver to the brim 10 times.

H. 140

I. The area is equivalent to a single-lane highway from Denver to Chicago.

J. A surface area of 32 city blocks by a quarter mile high.

K. 162

L. 164,000 square miles

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DO NOT DELAY—CRITICAL TO FLIGHT SAFETY!